EXHIBIT A

CERTIFICATION OF THE TRANSLATION

I, John F. Bukacek, declare that:

1. I am a certified translator who is knowledgeable in both the Japanese and English languages.

2. The attached is an independent translation of Japanese Laid-Open (Kokai) Patent Application No. H3-239091 ("Moving Body Radio Communication Apparatus") from the Japanese language into the English language, rendered to the best of my knowledge and ability.

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Sworn and subscribed before me
This 13 th day of February 2007.

"OFFICIAL SEAL"
C. Jezwiak
Notary Public, State of Illinois
My Commission Expires May 17, 2010

DRAFT TRANSLATION

English Translation of Japanese Laid-open Patent Application

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(54) MOVING BODY RADIO COMMUNICATION APPARATUS

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SPECIFICATION

1. Title of the Invention

Moving Body Radio Communication Apparatus

2. Claims

Moving body radio communication apparatus, characterized in being equipped with control channel transceivers that transmit to and receive from a moving body control signals for controlling radio communication with a moving body having the capacity to transmit and receive using control channels that are specifically allocated, and a traffic channel transceiver means that transmit and receive signals for communication and control with respect to a moving body using traffic channels that are specifically allocated, and a plurality of base stations possessing control means that control the aforementioned means and a shared channel reception means that receives position locating signals from a moving body using shared channels that are specifically allocated, and a switching station that receives data in the aforementioned position locating signals and that transmits and receives communications signals and control signals between the control means, with there being a connection between a telecommunications network and the control means of the above-mentioned bases, and a position locating means that locates the position of a moving body, being connected to the switching station.

3. <u>Detailed Description of the Invention</u>

Field of Industrial Use

This invention relates to a moving body radio communication apparatus possessing a switching station and a plurality of base stations, and in particular, this invention relates to a moving body radio communication apparatus possessing a moving body position locating function.

Prior Art

FIG. 4 shows a configuration of a prior art automobile telephone system, as described, for example in <u>*BSTJ*</u>, January 1979, Vol. 58, No. 1, Page 158, Fig. 4, where ***1*** is a switching station; ***3a – 3n*** are base stations; ***4a – 4n*** are base station antennas; ***5*** is mobile equipment located in an automobile or the like; ***8*** is an antenna for mobile equipment; ***11a – 11n*** are control devices for the base stations ***3a – 3n***; ***12a – 12n*** are control channel transceivers that transmit and receive signals for the control channels allotted for each of the base stations ***3a – 3n***; ***13a – 13n*** are locator receivers; ***14a – 14n*** are traffic channel transceivers that transmit and receive signals for traffic channels allotted for each of the base stations ***3a – 3n***; ***15a – 15n*** are antenna-sharing devices; ***21*** is a junction point between the switching station ***1*** and the public telecommunications network; ***22a – 22n*** are telecommunication circuit junction points between the switching station ***1*** and the base stations ***3a – 3n***; ***23a – 23n*** are data circuit junction points; ***25a – 25n*** are junction points between the control channel transceivers ***12a – 12n*** and the control devices ***11a – 11n***; ***26a – 26n*** are junction points between the locator receivers ***13a – 13n*** and the control devices ***11a – 11n***; ***27a – 27n*** and ***28a – 28n*** are junction points between the traffic channel transceivers ***14a – 14n*** and the control devices ***11a – 11n***; and ***29a – 29n***, ***30a – 30n***, and ***31a – 31n*** are junction points between the control channel transceivers ***12a – 12n***, the locator receivers ***13a – 13n***, and the traffic channel transceivers ***14a – 14n***, respectively, and the antenna-sharing devices ***15a – 15n***.

Next, the operation is described. The control channel transceivers ***12a – 12n*** of the base stations ***3a – 3n*** are modulated by reporting signals that include identifier signals from the base stations ***3a – 3n***, and the carrier waves of the respectively differing radio frequencies are continuously transmitted. The mobile equipment ***5*** scans all of the designated control channels, fixes to the one with the largest reception electrical field, and stands by. At this point, suppose that a call was made to a specific mobile equipment ***5*** at the junction point ***21*** connecting to the public telecommunications network. The switching station ***1*** issues a command to the base station ***3a – 3n*** to call the specified mobile equipment ***5***, and when this is received, the control device ***11a – 11n*** radiates a call signal in the space from the antenna ***4a – 4n*** via the control channel transceivers ***12a – 12n*** and the antenna-sharing devices ***15a – 15n*** to call the mobile equipment ***5***. The mobile equipment ***5*** stands by to receive the strongest electrical field, for example, from the base station ***3a***, and receives the call signal from the base station ***3a***, and immediately transmits a response signal. The base station ***3a*** which receives the response signal allots an empty traffic channel of the traffic channel transceivers ***14a***, establishing a state of voice communication. The switching station ***1*** establishes a switching connection between the

traffic channel designated by the base station ***3a***. If the voice communication quality of the current traffic channel degrades, then the control device ***11a*** relies on the measurement of the electrical field of the current traffic channel by a nearby base station, e.g., the base station ***3b – 3e***, via the switching station ***1***. Measurement of the electrical field is carried out by the locator receiver ***13b – 13e*** of the base station ***3b – 3e***, and supposing that the electrical field of the base station ***3c*** is the largest, then the switching station ***1*** will issue a command to the mobile equipment ***5*** via the current traffic channel to switch to an idle traffic channel of the base station ***3c***, thereby switching and connecting the circuit of the public telecommunications network to a new traffic channel. Furthermore, if there is a call from the mobile equipment ***5***, the operation is the reverse of that described above. If either the public telecommunications network or the mobile equipment ***5*** terminates, then the switching station ***1*** and the control device ***3c*** terminate operation.

Problems to be Solved by the Invention

The prior art automobile telephone system had a constitution as described above, and was suited for wireless radio analog transmission, and when migrating to digital transmission (TDMA format), the distance between the base station ***3a – 3n*** and the mobile equipment ***5*** had be measured, and equipment was needed for that.

This invention was devised to solve the above-mentioned problem, and has as its object to make it possible to measure the distance between a base station and a moving body, and also to produce a moving body radio communication apparatus that can locate the position of a moving body.

Means for Solving These Problems

The moving body radio communication apparatus of this invention is provided with a plurality of base stations that possess a shared channel reception means that receives position locating signals from a moving body using shared channels that are allotted jointly, a switching station that receives data in the form of these position locating signals, and a position locating means that is connected to the switching station, inputs the above-mentioned data, and locates the position of a moving body.

Operation of the Invention

In this invention, a moving body transmits position locating signals using shared channels allotted jointly to the base stations, the shared channel transceivers of the base stations receive these position locating signals and transmit the data to the switching stations, the switching stations transmit this data to a position locating means, and the position locating means locates the position of the moving body.

Working Examples

A working example of this invention is described below with drawings. **FIG. 1** shows a configuration of a moving body position locating apparatus in accordance with this working

example, where reference numeral ***2*** is a position location calculating device, ***16a – 16n*** are shared channel receivers provided within the base stations ***3a – 3n***, which transmit to and receive from a shared channel ***12*** allotted jointly to the base stations ***3a – 3n***. Reference numeral ***24*** is a junction point between the switching station ***1*** and the position location calculating device ***2***; ***32a – 32n*** are junction points between control devices ***11a – 11n*** and the shared channel receivers ***16a – 16n***; ***33a – 33n*** are junction points between the shared channel receivers ***16a – 16n*** and antenna-sharing devices ***15a – 15n***. The rest of the configuration is identical to that of **FIG. 4**.

Next, the operation is described. The control channel transceivers ***12a – 12n*** are modulated by announcing signals that contain identifier signals of the base stations ***3a – 3n***, and the carrier waves of the respectively differing radio frequencies are continuously transmitted. The mobile equipment ***5*** scans all of the designated control channels, fixes to the one with the largest reception electrical field, and stands by. For example, if the mobile equipment ***5*** is positioned within the zone of the base station ***3a***, it waits for signals from the control channel transceiver ***12a***. At this point, if there is a request to locate the position of a specific mobile equipment ***5*** at the junction point ***21*** connecting to the public telecommunications network, then the exchange station ***1*** issues a command to the base stations ***3a – 3n*** to call and locate the position of the mobile equipment ***5***. When this is received, the control device ***11a – 11n*** radiates a call signal in the space from the antenna ***4a – 4n*** via the control channel transceivers ***12a – 12n*** and the antenna-sharing devices ***15a – 15n*** to call the mobile equipment ***5***. The mobile equipment ***5*** stands by to receive the signal with strongest electrical field from among the radiated position locating call signals radiated by the base station ***3a***, using the control channel, and when this position locating call signal is received, it immediately transmits a response signal, switching to a shared channel and emitting a position locating signal which is a burst digital signal. The base station ***3a*** that receives the response signal reports to the switching station ***1*** that the mobile equipment ***5*** is within its own zone. Furthermore, when some of the shared channel receivers ***16a – 16n*** of the base stations ***3a – 3n*** receive the position locating signal from the mobile equipment ***5***, the absolute time or the relative time when the position locating signal arrives is determined by correlation detecting the unique word contained therein, and reports to the switching station ***1*** via the control devices ***11a – 11n*** data such as the difference in arrival time of position locating signals with respect to the various base stations ***3a – 3n***. The base station ***1*** forwards these data to the position location calculating device ***2***, and the position of the mobile equipment ***5*** is calculated. In this case, if there are many [illegible] values of the shared channel receivers ***16a – 16n***, and if the density is suitable, the accuracy of the position locating can be quite high.

Next, suppose that a call is made to a specific mobile equipment ***5*** at the junction point ***21*** connecting to the public telecommunications network. In this case, the switching station ***1*** issues a command to the base station ***3a – 3n*** to call the specified mobile equipment ***5***. When this is received, the control device ***11a – 11n*** radiates a call signal in the space from the antenna ***4a – 4n*** via the control channel transceivers ***12a – 12n*** and the antenna-sharing devices ***15a – 15n*** to call the mobile equipment ***5***. The mobile equipment ***5*** stands by to receive the signal with the strongest electrical field from among the call signals, for example, standing by with the control channel of the base station ***3a***, receives the call signal from the base station ***3a***, and immediately transmits a response signal. The base station ***3a*** which receives the response signal allots an idle traffic channel of the traffic channel transceivers ***14a***, establishing a state of voice

communication. The switching station *1* establishes a switching connection between the traffic channel designated by the base station *3a*. At this point, if the voice communication quality of the current traffic channel degrades, then the control device *11a* issues a command to the mobile equipment *5* to transmit a position locating signal using a shared channel via the currently used traffic channel. When this command is received, the mobile equipment *5* switches to a shared channel and transmits a position locating signal, returning to the current traffic channel. When the shared channel receivers *16a – 16n* receives this position locating signal, it determines the arrival time from the unique word therein, and reports these data to the switching station *1* via the control devices *11a – 11n*. The switching station *1* reports these data to the position location calculating device *2*, establishing the position of the mobile equipment *5*. In accordance with these position location results, if, for example, the mobile equipment *5* is within the zone of the base station *3c*, the switching station *1* posts an inquiry to the control device *11c* of the base station *3c* as to an idle traffic channel, and issues a command to the mobile equipment *5* to switch to an idle traffic channel of the base station *3c*, thereby switching and connecting the circuit of the public telecommunications network to a new traffic channel. It should be noted that the junction points *22a – 22n* are used for voice communication signals, and the junction points *23a – 23n* are used for data or control signals. If a call originates from the mobile equipment *5*, the operation is the reverse of that described above. If either the public telecommunications network or the mobile equipment *5* terminates, then the switching station *1* and the control device *11c* terminate operation.

FIG. 2 shows a configuration of the shared channel receivers *16a – 16n*, and *41* is a high-frequency filter, *42* is a high-frequency amp, *43* is a primary mixer, *44* is a synthesizer that generates a primary local frequency, *45* is a primary intermediate frequency filter, *46* is a primary intermediate frequency amp, *47* is a secondary mixer, *48* is a crystal oscillator that generates a secondary local frequency, *49* is a secondary intermediate frequency filter, *50* is a secondary intermediate frequency amp, *51* is a detector/decoder, *52* is a unique word detection circuit, *53* is a time measurement circuit, *54* is a standard clock, and *55* is a control circuit.

In the configuration of **FIG. 2**, when a high-frequency signal modulated by a position locating signal is input to the junction point *33* connecting to the antenna-sharing devices *15*, it is selected by the high-frequency filter *41*, amplified by the high-frequency amp *42*, mixed with the output of the synthesizer *44*, using the primary mixer *43*, and converted to a primary intermediate frequency. After that, it is selected by the primary intermediate frequency filter *45*, amplified by the intermediate frequency amp *46*, mixed with the output of the secondary local frequency crystal oscillator *48*, using the secondary mixer *47*, and converted to a secondary intermediate frequency. Moreover, it is selected by the secondary intermediate frequency filter *49*, amplified by the secondary intermediate frequency amp *50*, and decoded to a position locating signal using the detector/decoder *51*. The position locating signal includes a unique word on the order of 14 bits, and the unique word detection circuit *52* detects the correlation with the original unique word, and when the correlation reaches a peak, the time measurement circuit *53* is triggered. The standard clock *54* is an ultra-high precision clock, and the time measurement circuit *53* measures the absolute time of the above-mentioned trigger, and reports it to the switching station *1* from the control circuit *55* via the control device *11*. Furthermore, conversely, the time of the standard clock *54* is corrected by the switching station *1*. Since the unique word correlation detection is accurate to a level of 1/50 bit, if the bit rate of the unique

word is 50 kbps, then the precision is (1 sec + 50 kbps) x 1/50 = 0.4 [illegible], so the precision in locating the mobile equipment *5* is on the order of 120 m. If the bit rate is 500 kbps, then the location precision is improved by about 12 m.

FIG. 3 shows a configuration of a moving body radio communication apparatus of a second working example of this invention, and ***7a – 7k*** are position locating stations, ***8a – 8k*** are antennas thereof, ***17a – 17k*** are control devices, ***18a – 18k*** are shared channel receivers, and ***34a – 34k*** are contact points between the shared channel receivers ***18a – 18k*** and the antennas ***8a – 8k***. The rest of the configuration is identical to that of **FIG. 1**.

In the configuration of **FIG. 3**, the position locating stations ***7a -7k*** are provided to increase the accuracy of locating the position of the mobile equipment *5*, and when the mobile equipment *5* transmits a position locating signal using a shared channel, the arrival time is measured, and the data is reported to the switching station *1*. The switching station *1* transmits the data from the base stations ***3a – 3n*** and the data from the position locating stations ***7a – 7k*** to the position location calculating device *2*, causing the position of the mobile equipment *5* to be calculated. The rest of the configuration is identical to that of **FIG. 1**.

It should be noted that in the above working examples, with regard to the shared channels, only the receivers ***16a – 16n*** were provided, but even if these were transceivers, the same results would be obtained, and moreover, messages could be left with the mobile equipment *5*.

Advantageous Effects of the Invention

In accordance with the invention as described above, it is possible to locate the position of a moving body and determine the distance between a base station and a moving body and digitally transmit with a radio circuit by providing a car telephone system with base stations and a shared channel receiving means, and connecting a moving body position location means to a switching station.

4. Detailed Description of the Drawings

FIG. 1 and **FIG. 2** are schematic diagrams of a moving body radio communication apparatus of the first working example and of a shared channel receiving means. **FIG. 3** is a schematic diagram of working example 2 of this invention. **FIG. 4** is a schematic diagram of a prior art device.

1 .... Switching station
2 .... Position location calculating device
3a – 3n .... Base stations
4a – 4n, 6 .... Antennas
5 .... Mobile equipment
11a – 11n .... Control devices
12a – 12n .... Control channel transceivers
14a – 14n .... Traffic channel transceivers
16a – 16n .... Shared channel receivers

It should be noted that the reference numerals in the drawings show identical or corresponding parts.

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FIG. 1

FIG. 2

FIG. 3

FIG. 4

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⑭発明の名称 移動体無線通信装置

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明 細 書

1. 発明の名称

移動体無線通信装置

2. 特許請求の範囲

専用に割当てられた制御チャネルにより送受信機能を有する移動体との無線通信を制御する制御信号を移動体に対して送受信する制御チャネル送受信手段と専用に割当てられたトラフィックチャネルにより移動体に対して通話及び制御のための信号を送受信するトラフィックチャネル送受信手段と共通に割当てられた共通チャネルにより移動体からの位置測定信号を受信する共通チャネル受信手段と上記各手段を制御する制御手段をそれぞれ有する複数の基地局と、上記各基地局の制御手段と通信網との間に接続され、各制御手段との間で通話信号、制御信号を送受信するとともに、上記各位置測定信号中のデータを受信する交換局と、交換局に接続され、上記各データを入力されて移動体の位置を測定する位置測定手段を備えたことを特徴とする移動体無線通信装置。

3. 発明の詳細な説明

〔産業上の利用分野〕

この発明は、交換局及び複数の基地局を有する移動体無線通信装置に関し、特に移動体位置測定機能を有する移動体無線通信装置に関するものである。

〔従来の技術〕

第4図は例えばBSTJ January 1979, Vol.58, No.1, Page153, Fig.4 に示された従来の自動車電話システムの構成を示し、1は交換局、3a～3nは基地局、4a～4nは基地局アンテナ、5は自動車などに設置された移動機、6は移動機アンテナ、11a～11nは各基地局3a～3nの制御装置、12a～12nは各基地局3a～3n毎に専用に割当てられた制御チャネルにより送受信する制御チャネル送受信機、13a～13nはロケータ用受信機、14a～14nは各基地局3a～3n毎に専用に割当てられたトラフィックチャネルにより送受信するトラフィックチャネル送受信機、15a～15nはアンテナ共用器、21は交

換局1と公衆通信網との接続点、22a～22nは交換局1と基地局3a～3nとの通信回線の接続点、23a～23nはデータ回線の接続点、25a～25nは制御チャネル送受信機12a～12nと制御装置11a～11nとの接続点、26a～26nはロケータ用受信機13a～13nと制御装置11a～11nとの接続点、27a～27n、28a～28nはトラフィックチャネル送受信機14a～14nと制御装置11a～11nとの接続点、29a～29n、30a～30n、31a～31nはそれぞれ制御チャネル送受信機12a～12n、ロケータ用受信機13a～13n及びトラフィックチャネル送受信機14a～14nとアンテナ共用器15a～15nとの接続点である。

次に、動作を説明する。各基地局3a～3nの制御チャネル送受信機12a～12nは各基地局3a～3nの識別信号を含んだ報告信号により変調され、それぞれ異なった無線周波数の搬送波を常時送信している。移動機5は指定された全ての制御チャネルをスキャンし、そのうちの受信電界が最も大きいチャネルに固定して待受ける。ここで、公衆通信網との接続点21にある特定の移動機5に呼び出しがかかったとする。交換局1は基地局3a～3nに対して移動機5を呼び出すよう指令を出し、これを受けて制御装置11a～11nは移動機5を呼びだすため呼び出し信号を制御チャネル送受信機12a～12n及びアンテナ共用器15a～15nを介してアンテナ4a～4nから空間に放射する。移動機5はそのうちの最も電界の強い例えば基地局3aを待ち受けており、基地局3aからの呼び出し信号を受信し、直ちにレスポンス信号を返信する。このレスポンス信号を受信した基地局3aはトラフィックチャネル送受信機14aの空きのトラフィックチャネルを割り当て、通話状態となる。交換局1は基地局3aの設定したトラフィックチャネルと公衆通信網との交換接続を行う。現在のトラフィックチャネルの通信品質が劣化すると、制御装置11aは交換局1を通じて周辺の基地局、例えば基地局3b～3eに現在のトラフィックチャネルの電界の測定を依頼する。電界の測定は各基地局3b～3eのロケータ用受信機13b～13eが行い、仮に基地局3eの電界が最も大きければ交換局1は現在のトラフィックチャネルを通じて移動機5に対して基地局3eの空きトラフィックチャネルと切換えるように指令を行い、公衆通信網の回線を新しいトラフィックチャネルに交換接続する。又、移動機5から呼び出しがあった場合には、上記と逆の動作を行う。公衆通信網あるいは移動機5のいずれかが終話をすると、交換局1及び制御装置11aは終話動作を行う。

【発明が解決しようとする課題】

従来の自動車電話システムは以上のように構成されており、無線回線のアナログ伝送には適しているが、ディジタル伝送(TDMA方式)への移行に際しては基地局3a～3nと移動機5との距離を測定しなければならず、このための装置が必要であった。

この発明は上記のような課題を解決するために成されたものであり、基地局と移動体との距離を測定することができるとともに、さらに移動体の位置測定を行うことができる移動体無線通信装置を得ることも目的とする。

【課題を解決するための手段】

この発明に係る移動体無線通信装置は、共通に割当てられた共通チャネルにより移動体からの位置測定信号を受信する共通チャネル受信手段を有する複数の基地局と、この各位置測定信号中のデータを受信する交換局と、交換局に接続され、上記データを入力されて移動体の位置を測定する位置測定手段を設けたものである。

【作用】

この発明において、移動体は各基地局に共通に割当てられた共通チャネルにより位置測定信号を送信し、各基地局の共通チャネル受信機はこの位置測定信号を受信してそのデータを交換局へ送り、交換局はこのデータを位置測定手段へ送り、位置測定手段は移動体の位置を測定する。

【実施例】

以下、この発明の実施例を図面とともに説明する。第1図はこの実施例による移動体位置標定装置の構成を示し、2は位置標定計算装置、16a～16nは基地局3a～3n内に設けられた共通チャネル受信機で、各基地局3a～3nに共通に割当てられた共通チャネル12より送受信する。24は交換局1と位置標定計算装置2との接続点、33a～33nは制御装置11a～11nと共通チャネル受信機16a～16nとの接続点、34a～34nは共通チャネル受信機16a～16nとアンテナ共用器15a～15nとの接続点である。他の構成は第4図と同様である。

次に、動作を説明する。各基地局3a～3nの制御チャネル送受信機12a～12nは各基地局3a～3nの識別信号を含んだ報知信号で変調され、それぞれ異なった無線周波数の搬送波を常時送信している。移動機5は指定された全ての制御チャネルをスキャンし、そのうちの受信電界が最も大きいチャネルに固定し、待受けている。例えば、移動機5が基地局3aのゾーン内に位置していれば、制御チャネル送受信機12aからの信号を待受けている。ここで、公衆通信網との接続点21における特定の移動機5の位置標定の依頼があると、交換局1は基地局3a～3nに対して移動機5の呼び出しと位置標定を指令する。これを受けて、制御装置11a～11nは位置標定呼び出し信号を制御チャネル送受信機12a～12n及びアンテナ共用器15a～15nを介してアンテナ4a～4nから空間に放射する。移動機5は放射された位置標定呼び出し信号のうち最も電界が強い信号を放射した基地局3aの制御チャネルで待受けており、この位置標定呼び出し信号を受信すると直ちにレスポンス信号を送信するとともに共通チャネルに切換えてバースト状のデジタル信号である位置標定信号を送出する。レスポンス信号を受信した基地局3aは、交換局1に移動機5が自局のゾーン内にいることを報告する。又、各基地局3a～3nの共通チャネル受信機16a～16nのうちのいくつかは移動機5からの位置標定信号を受信すると、その中に含まれているユニークワードを相関検波することにより位置標定信号が到着した絶対時間あるいは相対時間を測定し、位置標定信号の各基地局3a～3nへの到着時間差などのデータを制御装置11a～11nを介して交換局1へ報告する。交換局1はこれらのデータを位置標定計算装置2へ転送し、移動機5の位置を計算させる。この場合、共通チャネル受信機16a～16nの設置数が多く、密度が適当であれば、位置標定の精度を十分高くすることができる。

次に、公衆通信網との接続点21に対してある特定の移動機5への通話呼び出しがかかったとする。この場合、交換局1は基地局3a～3nに対して移動機5を呼び出すよう指令する。これを受けて、制御装置11a～11nは移動機5の呼び出し信号を制御チャネル送受信機12a～12n及びアンテナ共用器15a～15nを介してアンテナ4a～4nから空間へ放射する。移動機5は各呼び出し信号のうち最も電界が強い信号を放射する例えば基地局3aの制御チャネルで待受けており、基地局3aからの呼び出し信号を受信し、直ちにレスポンス信号を送信する。レスポンス信号を受信した基地局3aはトラフィックチャネル送受信機14aの空きのトラフィックチャネルを割当て、通話状態となる。交換局1は基地局3aが指定したトラフィックチャネルと公衆通信網との交換接続を行う。ここで、現在のトラフィックチャネルの通話品質が劣化すると、制御装置11aは現在使用しているトラフィックチャネルを介して移動機5に共通チャネルを用いた位置標定信号の送信を指令する。この指令を受けて、移動機5は共通チャネルに切換えて位置標定信号を送信し、現在のトラフィックチャネルに復帰する。共通チャネル受信機16a～16nはこの位置標定信号を受信すると、その中のユニークワードから到着時間を測定し、これらのデータを制御装置11a～11nを介して交換局1に報告する。交換局1はこれらのデータを位置標定計算装置2に報告し、移動機5の位置を標定させる。この位置標定結果により、例えば移動機5が基地局3aの

B 11

ゾーン内にあった場合には、交換局1は基地局3cの制御装置11cに対して空きトラフィックチャネルを問い合せ、また移動機5に対して基地局3cの空きトラフィックチャネルに切換えるように指令を行い、公衆通信網の回線を新しいトラフィックチャネルに交換接続する。なお、接続点22a～22nは通話信号用であり、接続点23a～23nはデータ又は制御信号用である。

移動機5からの発呼の場合には、上記と逆の動作を行う。公衆通信網又は移動機5のいずれかが終話すると、交換局1及び制御装置11cは終話動作を行う。

第2図は共通チャネル受信機16a～16nの構成を示し、41は高周波フィルタ、42は高周波アンプ、43は第1ミキサ、44は第1局発周波数を発生するシンセサイザ、45は第1中間周波フィルタ、46は第1中間周波アンプ、47は第2ミキサ、48は第2局発周波数を発生する水晶発振器、49は第2中間周波フィルタ、50は第2中間周波アンプ、51は検波・復号器、52はユニークワード検出回路、53は時間測定回路、54は標準時計、55は制御回路である。

第2図の構成において、アンテナ共用器15との接続点33に位置測定信号で変調された高周波信号が入力されると、高周波フィルタ41で選択され、高周波アンプ42で増幅され、第1ミキサ43でシンセサイザ44の出力と混合され、第1中間周波数に変換される。その後、第1中間周波フィルタ45で選択され、第1中間周波アンプ46で増幅され、第2ミキサ47で第2局発の水晶発振器48の出力と混合され、第2中間周波数に変換される。さらに、第2中間周波フィルタ49で選択され、第2中間周波アンプ50で増幅され、検波・復号器51で位置測定信号に復号される。位置測定信号には14ビット程度のユニークワードが含まれており、ユニークワード検出回路52では元のユニークワードとの相関を検出し、相関がピークになった時点で時間測定回路53にトリガをかける。標準時計54は超高精度の時計であり、時間測定回路53は上記トリガの絶対時刻を測定し、制御回路55から制御装置11を介して交換局1に報告する。又、逆に標準時計54は交換局1により時間補正される。ユニークワードの相関検出は$\frac{1}{50}$ビット程度の精度であるため、ユニークワードのビットレートを50kbpsとすると、(1sec÷50kbps)×$\frac{1}{50}$≒0.4μsの精度であり、移動機5の測定精度は120m程度となる。ビットレートを500kbpsとすると、測定精度は12m程度まで改善される。

第3図はこの発明の第2の実施例による移動体無線通信装置の構成を示し、7a～7kは位置測定局、8a～8kはそのアンテナ、17a～17kは制御装置、18a～18kは同じく共通チャネル受信機、34a～34kは交換局1と制御装置17a～17kとの接続点、35a～35kは共通チャネル受信機18a～18kとアンテナ8a～8kとの接続点である。他の構成は第1図と同様である。

第3図の構成において、位置測定局7a～7kは移動機5の位置を測定するときの精度を向上するために設けられたものであり、移動機5が共通チャネルで位置測定信号を送信したとき、その到着時間を測定し、そのデータを交換局1に報告する。交換局1は各基地局3a～3nからのデータと位置測定局7a～7kからのデータを位置測定計算装置2へ転送し、移動機5の位置を計算させる。他の動作は第1図と同様である。

なお、上記各実施例においては、共通チャネルについては受信機16a～16nのみを設けたが、これを送受信機としても同様の効果が得られ、その上移動機5とのメッセージ通話が可能となる。

〔発明の効果〕

以上のようにこの発明によれば、自動車電話システムなどにおいて、各基地局に共通チャネル受信手段を設けるとともに、交換局に移動体位置測定手段を接続することにより、基地局と移動体との距離測定を可能にして無線回路のデジタル伝送を可能にするとともに、移動体の位置を測定することができる。

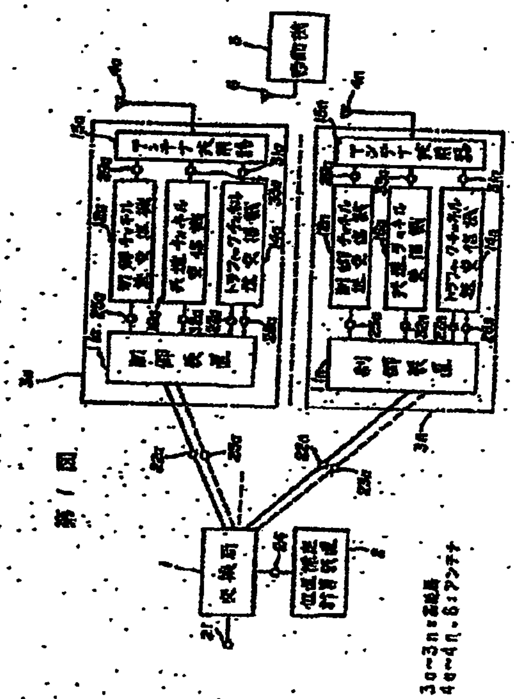
4．図面の簡単な説明

第1図及び第2図はこの発明の第1の実施例による移動体無線通信装置の構成図及びその共通チャネル受信機の構成図、第3図はこの発明装置の第2の実施例による構成図、第4図は従来装置の構成図である。

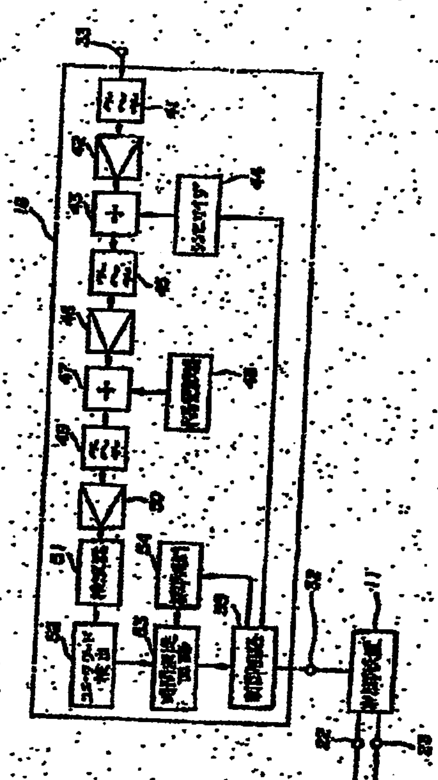
1…交換局、2…位置測定計算装置、3a～3n…基地局、4a～4n、6…アンテナ、5…移動機、11a～11n…制御装置、12a～12n…制御チャネル送受信機、14a～14n…トラフィックチャネル送受信機、16a～16n…共通チャネル受信機。

なお、図中同一符号は同一又は相当部分を示す。

代理人 大岩増雄

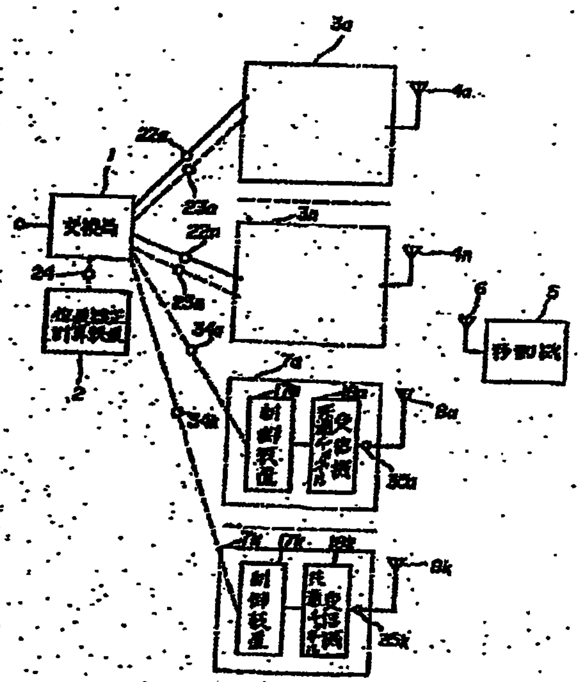


第1図



第2図

第3図



第 4 図

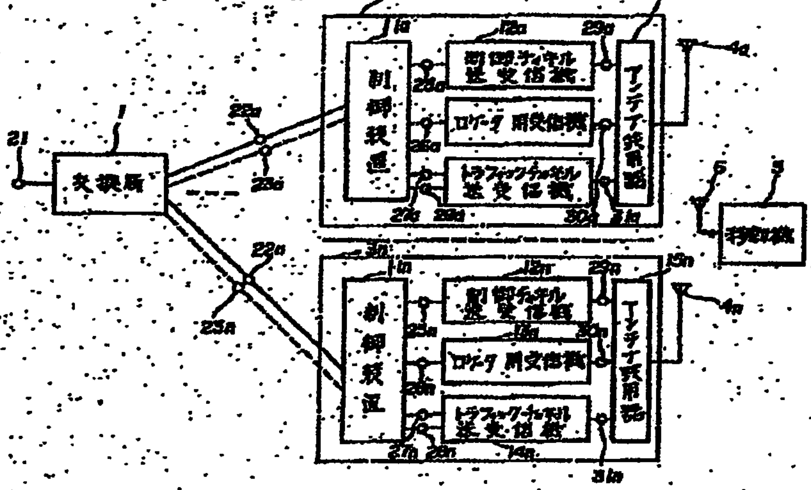

21
1
交換局
22a
23a
22n
23n
3a
11a
12a
29a
15a
4a
制御装置
制御チャネル送受信機
ロケータ用受信機
トラフィックチャネル送受信機
アンテナ共用器
25a
26a
27a
28a
30a
31a
5
3
移動機
3n
11n
12n
29n
15n
4n
25n
13n
30n
26n
27n
28n
14n
31n

EXHIBIT B

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TRUEPOSITION, INC.,	)	
	)	
PLAINTIFF/ COUNTERCLAIM- DEFENDANT,	)	
	)	
v.	)	CA NO. 05-00747-SLR
	)	
ANDREW CORPORATION,	)	
	)	
DEFENDANT/ COUNTERCLAIM-PLAINTIFF.	)	

EXPERT REPORT OF DR. DAVID GOODMAN
ON THE INVALIDITY OF U.S. PATENT NO. 5,327,144

I. INTRODUCTION

Andrew Corporation has retained me as a technical expert in this case. I expect to testify at trial regarding the matters set forth in this report if asked by the Court or the parties' attorneys. I will also be prepared to provide the Court and the jury with a tutorial on the technology involved in this matter, including the evolution of the technology. I am being compensated for my work associated with the litigation at my customary rate of $600 per hour. My compensation does not depend on the outcome of this litigation, the opinions I express, or my testimony.

I understand that TruePosition, Inc. has asserted certain claims of United States Patent 5,327,144 against Andrew Geometrix products. I submit this expert report, which contains my opinion regarding the invalidity of the claims of the '144 patent asserted by TruePosition. I have been asked to determine whether claims 1, 2, 22, 31, and 32, of the '144 patent are valid. For the reasons stated below, it is my opinion that the asserted claims are invalid because they are anticipated by Japanese Patent Application Kokai (Laid-Open) Publication No.: H3-239091, October 24, 1991 ("the Kono application").

II. BACKGROUND AND QUALIFICATIONS

A. QUALIFICATIONS

I am currently a Program Director at the National Science Foundation in Arlington, Virginia on temporary assignment from my position as a professor of Electrical and Computer Engineering at Polytechnic University in Brooklyn, New York. Before joining the NSF, I was Director of the Wireless Internet Center for Advanced Technology (WICAT), located at Polytechnic University, Columbia University, and the University of Virginia. WICAT is a National Science Foundation Industry/University Cooperative Research Center. From August 1999 until August 2001, I was Head of the Department of Electrical and Computer Engineering at Polytechnic University.

Before joining Polytechnic University in 1999, I was a Professor of Electrical and Computer Engineering at Rutgers, the State University of New Jersey. From 1988 until 1991, I was Chairman of the Department of Electrical and Computer Engineering at Rutgers. In 1989, I founded the Wireless Information Network Laboratory (WINLAB) at Rutgers University.

WINLAB was the first center of excellence at a United States university focused on cellular telecommunications. In 1991, WINLAB was designated the National Science Foundation Industry/University Cooperative Research Center for Wireless Information Networks. I was the Director of WINLAB until 1999, when I joined Polytechnic University.

From 1967 to 1988, I was at Bell Laboratories, where I held the position of Department Head in Communications Systems Research. In 1995, I was a Research Associate at the Program on Information Resources Policy at Harvard University. In 1997, I was Chairman of the National Research Council Committee studying "The Evolution of Untethered Communications."

I have extensive experience performing and managing research in telecommunications and digital signal processing. My research in cellular telecommunications has produced innovations covering multiple access protocols, network architecture, mobility management, and radio resources management. In 1986 and 1987, while I was employed by AT&T Bell Laboratories, I had a research assignment in the United Kingdom. As part of this assignment, I had detailed technical discussions with experts in several European countries who were participating in the establishment of the GSM cellular standard. At that time, I acquired a thorough understanding of GSM technology, and I have maintained this expertise ever since through technical discussions, participation in various forums, and in the conduct of my teaching, research, and writing.

I was one of the first professors to teach a college-level course in cellular telecommunications and have taught such courses since January 1989. In the early 1990's, I also presented a three-day short course at many large companies including Bell Atlantic Mobile, Pacific Bell, US West, Ericsson and AT&T. This course introduced corporate students to the operations of several cellular systems including AMPS, TDMA, and GSM. I have lectured and published widely on the subject of cellular telecommunications. My publications include approximately 100 papers. I have also consulted for many corporations in this field, including: Ericsson, Motorola, Lucent Technologies, and Nortel Networks.

I received a Bachelor's degree at Rensselaer Polytechnic Institute in 1960, a Master's degree at New York University in 1962, and a Ph.D. at Imperial College, University of London in 1967, all in electrical engineering.

I am a Member of the National Academy of Engineering, a Foreign Member of The Royal Academy of Engineering, a Fellow of the Institute of Electrical and Electronics Engineers, and a Fellow of the Institution of Electrical Engineers.

In 1997, I received the ACM/SIGMOBILE Award for "Outstanding Contributions to Research on Mobility of Systems Users, Data, and Computing." In 1999, I won the RCR Gold Award for the best presentation at the Conference on Third Generation Wireless Communications. In 2003, I received an IEEE Avant Garde Award for Contributions to Speech Coding and Internet-Packet Cellular Networks. Three of my papers on wireless communications have been cited as Paper of the Year by IEEE journals.

I am a frequent public speaker in a variety of forums on wireless communications. I am author of the books *Wireless Personal Communications Systems*, published in 1997 by Addison Wesley and co-author, with Roy Yates, of *Probability and Stochastic Processes A Friendly Introduction for Electrical and Computer Engineers, Second Edition*, published in 2004 by Wiley. I am co-editor of six other books on wireless communications. I am a named inventor on eight United States patents and have one patent application pending.

B. LIST OF AUTHORED PUBLICATIONS

Attached as Exhibit A to my report is my Curriculum Vitae, which contains a list of publications that I have authored since 1988.

C. PRIOR TESTIMONY

In the past four years I have provided expert testimony in depositions in the following cases: Aerotel, Ltd. v. Verizon Communications Inc. et al. (S.D.N.Y); PowerOasis, Inc. and PowerOasis Networks, LLC, v. T-Mobile USA, Inc., (D. NH); Papyrus Technology Corp. v. New York Stock Exchange, Inc., (S.D.NY); Agere v. Broadcom, (E.D. PA); and Freedom Wireless, Inc. v. Boston Communications Group, Inc. et al. (D. MA). In addition I testified at a Markman hearing and in a tutorial for the Court in Agere v. Broadcom, (E.D. PA).

D. Information Relied On

Attached as Exhibit B is a list of the materials that I reviewed in connection with my preparation of this report.

III. OPINIONS AND BASES FOR THOSE OPINIONS

A. Legal Standards

In conducting my analysis and forming my opinions I have received and relied upon information provided by counsel regarding the applicable legal standards on patent invalidity.

I understand that issued U.S. Patents are presumed valid and that the standard to prove invalidity is clear and convincing evidence.

I understand that for an independent patent claim to be anticipated by the prior art, the prior art reference must disclose each and every limitation of the claim either expressly or inherently. I also understand for a dependent claim to be anticipated by the prior art, the prior art reference must disclose each and every limitation of both the dependent claim and any claim(s) from which it depends.

I understand that for a patent claim to be invalid for obviousness the differences between the claimed invention as a whole and the prior art would have been obvious to a person of ordinary skill in the art at the time of the invention. I understand that before an obviousness determination can be made, I must consider the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the claimed invention and the prior art.

I understand that claims are construed according to their plain and ordinary meaning to one of ordinary skill in the art. I understand that the same claim construction must be used for both an infringement analysis and an invalidity analysis; I understand that claims cannot be construed one way for an infringement analysis and a different way for an invalidity analysis.

I also understand that the Court has not yet construed claim terms in this case, but that the parties have exchanged various preliminary claim interpretations. Regardless of which

constructions are adopted it is my opinion that the Kono application will anticipate the '144 patent if its claims are read broadly enough to cover Andrew's Geometrix products.

B. ORDINARY SKILL IN THE ART

A person of ordinary skill in the art of the '144 patent would have had a masters degree in electrical and computer engineering or computer science, or the equivalent skills and knowledge, and/or at least two years' experience at a cellular operating company, or a company that designs/produces cellular systems or services, including value added systems or services such as location determination.

C. THE '144 PATENT

The '144 patent is titled "Cellular Telephone Location System". Using the system disclosed in the patent, an AMPS cellular telephone network estimates the geographical coordinates of cellular telephones served by the network.

The technique at the heart of the purported invention is referred to as Time Difference of Arrival (TDOA) location determination. TDOA location determination was a well known technique at the time of the invention.

To use this technique in a cellular network, the patent dictates that at least three cell sites must receive the same radio signal from a cellular telephone. Each one converts the radio signal to a baseband signal, digitizes the base band signal and sends the digitized baseband signal, along with a time stamp to a central site. As shown in Figure 7 of the '144 patent, the central site uses correlation techniques to estimate the differences among times of arrival ("TDOA data") at all pairs of reporting cell sites. It uses the TDOA data to estimate the geographical coordinates of the cellphone by comparing the measured delays with a grid of reference delays stored at the central site. Each reference delay is associated with a unique geographical reference location. The central site uses a least squares metric to determine the best reference location. After determining the best reference location, the central site again uses a least squares technique to further refine the location estimate.

All of the claims of the '144 patent pertain to cellular telephone systems. Figures 1A and 1C of the '144 patent display some of the properties of a generic cellular system. Figure 1C

shows "the main components and arrangement of cellular telephone system." '144 Pat., Col. 1, ll. 51-52.

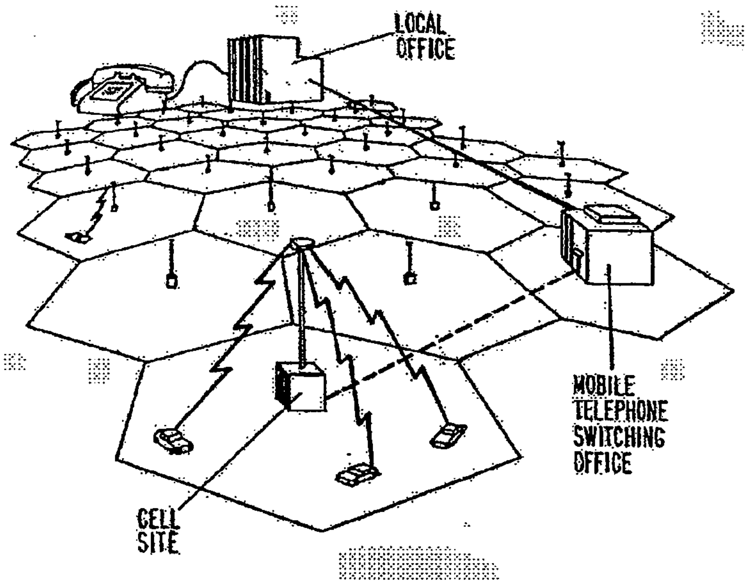


Fig. 1C, '144 Patent

Figure 2 of the '144 patent shows "a schematic diagram of a cellular telephone location system in accordance with the present invention." '144 Patent, Col. 7, ll. 60-62.

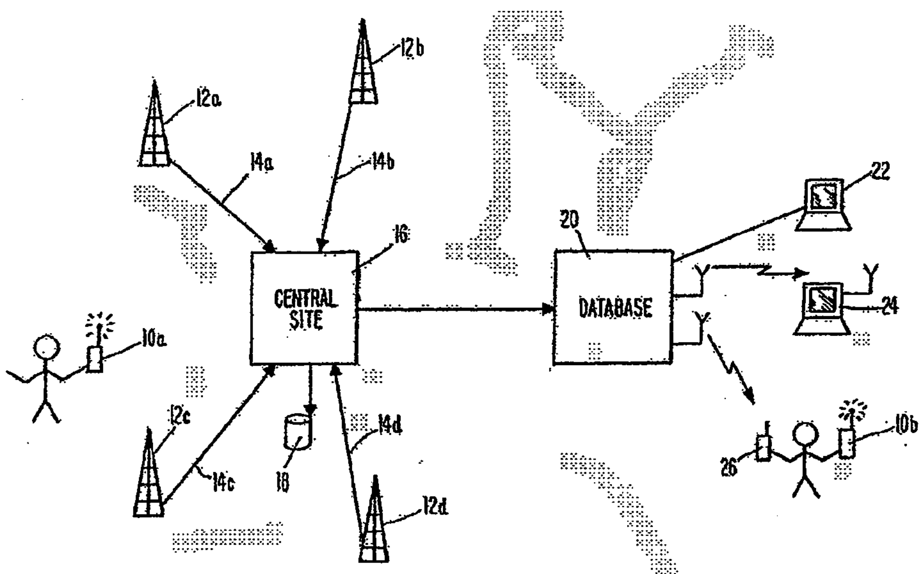


Fig. 2, '144 Patent

D. CLAIM TERMS

A person of ordinary skill in the art would recognize that the terms of art in the '144 patent were used to describe analog cellular systems in common use when the patent was filed in 1993.

(1) Analog Systems and Reverse Control Channels

In all of the patent claims, the first important limitation is "cellular telephones each initiating periodic signal transmissions over one of a prescribed set of reverse control channels". A person of ordinary skill in the art in 1993 would recognize reverse control channels as components of the analog cellular and dual-mode telephone systems specified in the United States national standard, ANSI 553, in Interim Standard 54, and Interim Standard 95 published by the Telecommunications Industry Association.

My interpretation is further supported by the following passage of the '144 patent, and the testimony of two named inventors regarding that passage. The '144 patent states:

> In addition, it should be noted that the inventive concepts disclosed herein are applicable to both analog and digital (for example, TDMA) cellular systems that employ analog control channels.

'144 patent, col. 1, lns. 27-31. A person of skill in the art would recognize "digital ... systems that employ analog control channels" to refer to cellular systems that carry voice information in a digital format and use the signal formats of the AMPS system for transmitting system control information.

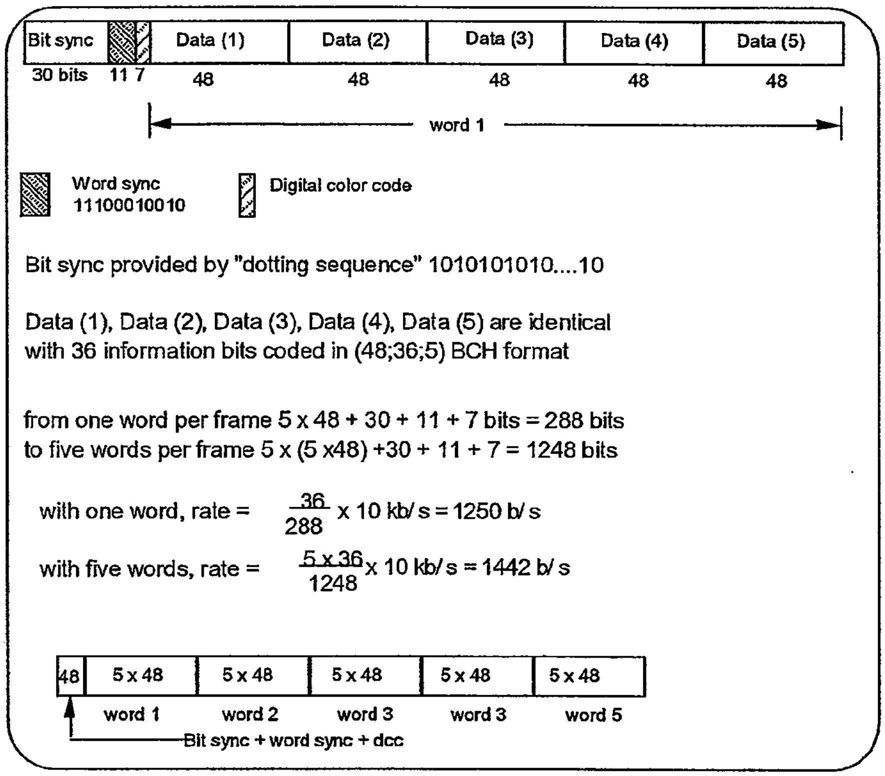
Named inventor Dr. Curtis Knight testified:

Q: What are analog control channels?

A: I'm not sure I know what was meant by that but what we had in mind was AMPS when we were writing this.

Knight October 6, 2006 Page 89 at 25 through Page 90 at 13. Named inventor Dr. John Webber concurred. Webber October 4, 2006 Page 23 at 9-18.

There are two types of transmissions disclosed in the '144 patent; one type is a signal transmitted over a "reverse control channel." The analog cellular standards that use the term "reverse control channel" specify that cellular telephones transmit information in a prescribed format that is different than the format specified by GSM. The format specified by analog cellular standards is illustrated in the following diagram that I prepared many years ago to explain the AMPS system to students:



<u>Fig. 3.10, Wireless Personal Communications Systems</u>

"Reverse control channels" also have a many-to-one property in that they convey information from many cellular phones to one base station.

In order to assert the '144 patent against cellular systems that use Andrew technology, True Position has to adopt an interpretation of "transmissions over ... reverse control channels" that is significantly more inclusive than the transmissions addressed by the '144 patent. This

inclusion would embrace a wider range of signal formats carried on channels that convey information from many cellular telephones to one base station.

(2) The Independent Claims

The independent claims (1, 22, and 31) asserted by True Position address details of: (a) the signal transmitted by a cellphone; (b) signal reception at the cellular cell sites; (c) the way in which the arrival time is determined at each cell site; (d) the nature of the reports transmitted by the cell sites to the location determination device; and (e) how the location determination device uses the reports to calculate the geographical coordinates of the cellphone.

a. Signals transmitted by a cellphone

The independent claims state that the signals used for location determination are transmitted periodically "over one of a prescribed set of reverse control channels".

b. Signal reception at the cell sites

Claim 1 requires that the signal reception be accomplished by an antenna and a baseband converter coupled to the antenna. In Claim 22, the cell sites are equipped to receive the signals from the cellphone and Claim 31 states that the location determination method receives the signals.

c. Determining arrival time at cell sites

Claim 1 requires a timing signal receiver for receiving a timing signal common to all cell sites.

d. Reports transmitted by the cell sites

Claim 1 requires that the baseband signal be sampled at a prescribed frequency and that the signal samples and a time stamp be formatted in digital data frames with a prescribed number of data bits. Claim 31 requires the cell site to produce frames of data with a prescribed number of data bits and time stamp bits.

e. Using the reports to calculate cellphone location

Claim 1 requires that the reports arrive at a central site system from the cell sites. The central site system processes the frames of data in the report to produce a table identifying individual signals and associated time differences of arrival at the cell sites. It then determines cellphone locations from the time differences of arrival. Claim 22 requires the system to have a database, accessible from remote locations, containing cellphone identities and locations. Claim 31 states that the system processes the frames of data from the cell sites to identify cellular telephones and differences in times of arrival and that it uses this information to determine cellphone location.

E. THE KONO APPLICATION

The title of the Kono application is translated to English as "Moving Body Radio Communication Apparatus". Like the '144 patent, it describes determination of the location of a cellular telephone from information about the arrival times at a plurality of base stations of a position locating signal transmitted by the telephone.

The Kono application states that the signal is transmitted on a shared channel and received at multiple base stations. Each base station determines the time of arrival of the position locating signal and transmits associated data to a switching station that in turn transmits the data to a position location calculating device. This device uses data from the base stations such as time differences of arrival at the multiple base stations to calculate the position of the cellphone.

F. RELATION OF THE '144 PATENT TO THE KONO APPLICATION

All of the claims of the '144 patent pertain to cellular telephone systems. As discussed above, Figure 2 of the '144 patent shows a "a schematic diagram of a cellular telephone location system in accordance with the present invention"; similarly, the Kono application places the invention in the context of a generic cellular system illustrated in Figures 1 and 4:

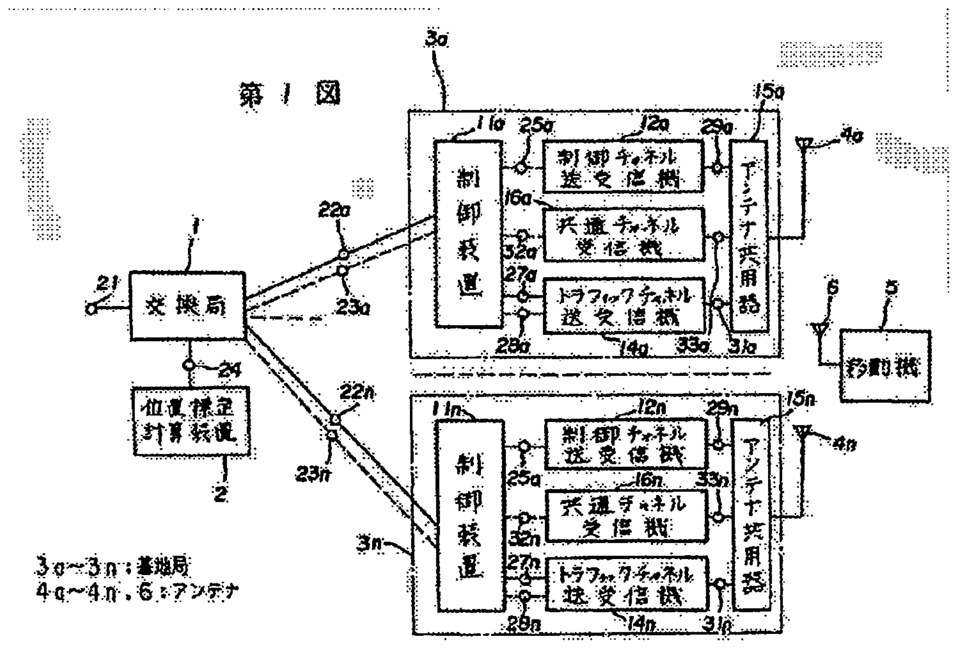


Fig. 1, Kono Application

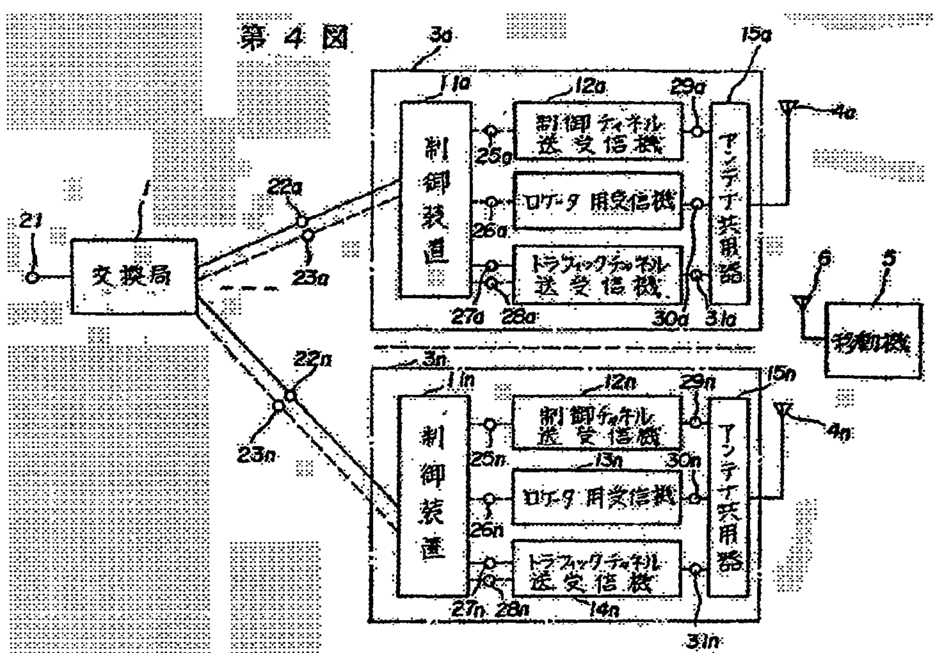


Fig. 4, Kono Application

Within this system, all of the claims of the '144 patent require periodic transmissions by the cellular telephones over reverse control channels. The Kono application describes "position locating signals from a moving body using shared channels" (page 3, 4th paragraph). It is clear that "moving body" in the Kono application is synonymous with the cellular telephone in the '144 patent.

All of the '144 patent claims require three or more cell site systems that receive the periodic transmissions from the cellular telephones. Similarly the Kono patent refers to *n* base stations (labeled *3a* to *3n* in Figures 1, 3, and 4, each containing a shared channel receiver (*16a – 16n*).

Claim 1 of the '144 patent requires "an elevated ground-based antenna" at each cell site. Figures 1, 3, and 4 of the Kono application also display antennas (labeled *4a – 4n*) at the *n* base stations.

Claim 1 of the '144 patent also includes a "baseband converter" for receiving the periodic transmissions on the reverse control channels. The corresponding device in the Kono application is a shared channel receiver at each base station (***16a – 16n***).

The cell site system in Claim 1 of the '144 patent also includes a "timing signal receiver for receiving a timing signal common to all base stations". The corresponding device in the Kono application is an ultra-high precision clock (labeled *54* in Figure 2) within each of the shared channel receivers. The ultra-high precision clocks at all of the base stations are "corrected by the switching station *1*". Page 5, ¶ 3, l. 16.

The other element of the cell site system in Claim 1 of the '144 patent is a "sampling subsystem" that samples the baseband signal and formats the samples and time stamps in frames of digital data. Each time stamp represents the time of arrival of one locating signal from a cellphone. In the Kono application, the base stations *3a – 3n* receive the position locating signal. A time measurement circuit (*53*) in each base station measures the absolute time of arrival and reports it to the switching station. A person of ordinary skill in the art would recognize that the report would be contained in data frames.

Part (b) of Claim 1 of the '144 patent specifies a "central site system operatively coupled to said cell site systems". The corresponding element of the Kono application is the switching station (*1*) in communication with the base stations (*3a – 3n*) through junction points (*23a – 23n)* that convey data or control signals between the switching system and the base stations.

The central site system in Claim 1 of the '144 patent processes the frames of data arriving from the cell site systems and generates a table containing information that identifies the signals arriving from the cell sites and time differences of arrival at the different cell sites. The central site system contains a "means for determining, on the basis of said times of arrival differences, the locations of the cellular telephones." In the Kono application the switching station "receives data in the form of these position locating signals" forwards the data received from the base stations to the position locating device (*2*). The position locating device uses the data to calculate the position of the cellular telephone.

Claim 2 of the '144 patent depends on Claim 1 and states that the timing signal receiver is a Global Position System receiver. In the Kono patent the timing signal common to all base stations exists at the switching station (*1*)*:* "...the time of the standard clock *54* is corrected by the switching station *1*." Page 5, ¶ 3, l. 16. Since at least as early as 1993, some cellular networks have had GPS receivers at every base station. The GPS receivers receive a timing signal common to all base stations. The location systems disclosed in the Kono reference work in conjunction with cellular networks. When those cellular networks have GPS receivers, they can be used with the location system disclosed.

Claim 22 of the '144 patent is less specific than Claim 1. In addition to base stations and reverse control channels Claim 22 requires simply a means of determining the locations of the cellular telephones "by receiving and processing signals emitted during said periodic reverse control channel transmissions". The elements of the Kono application that perform this function are the shared channel receivers in the base stations, the ultra-high precision clocks, the time measurement circuit, the switching station and the position locating device.

The remainder of Claim 22 specifies a "database means for storing location data identifying the cellular telephones and their respective locations, and for providing access to said database to subscribers at remote locations". Since their inception in the early 1990s, GSM

networks have had Home Location Registers ("HLRs") and Visitor Location Registers ("VLRs"). Because Andrew's products do not have a database, if TruePosition argues for an interpretation of "database means" that is broad enough to encompass Andrew's products, this element is anticipated by the HLR and VLR inherent in the cellular systems taught by the Kono application.

Claim 31 describes the same operations as Claim 1 without referring to the antenna, the baseband converter, the timing signal receiver, and the sampling subsystem at each cell site. It requires frames of data that are processed to identify individual telephones and time differences of arrival and using the time differences to determine the locations of the cellular telephones. The corresponding operations in the Kono application are described above in the comparison of Claim 1 of the '144 patent with the Kono application.

Claim 32 depends on Claim 31. It is identical to the final Claim element of Claim 22.

(1) Summary Chart Reflecting Opinions

Claim Language	Present In Kono?	Kono Disclosure
1. A cellular telephone location system for determining the locations of multiple mobile cellular telephones	Yes	"FIG. 1 shows a configuration of a moving body position locating apparatus" Page 3 ¶ 6, ll. 12.
each initiating periodic signal transmission over one of a prescribed set of reverse control channels, comprising:	Yes	"a moving body transmits position locating signals using shared channels" Page 3 ¶ 5, l. 1.
(a) at least three cell site systems, each cell site system comprising:	Yes	Base stations 3a-3n.
an elevated ground-based antenna;	Yes	Antennas 4a-4n.
a baseband convertor operatively coupled to said antenna for receiving cellular telephone signals transmitted over a reverse control channel by said cellular telephones and	Yes	Control channel transceivers 12a-12n.

Claim Language	Present In Kono?	Kono Disclosure
providing baseband signals derived from the cellular telephone signals;		
a timing signal receiver for receiving a timing signal common to all cell sites;	Yes	"...the time of the standard clock ***54*** is corrected by the switching station ***1***." Page 5, ¶ 3, l. 16.
and a sampling subsystem operatively coupled to said timing signal receiver and said baseband convertor for sampling said baseband signal at a prescribed sampling frequency and formatting the sample signal into frames of digital data, each frame comprising a prescribed number of data bits and time stamp bits, said time stamp bits representing the time at which said cellular telephone signals were received; and	Yes	Kono teaches software and processors in control circuit ***55*** that determine and format time of arrival information. Time stamp bits: "The standard clock ***54*** is an ultra-high precision clock, and the time measurement circuit ***53*** measures the absolute time of the above-mentioned trigger, and reports it to the switching station ***1*** from the control circuit ***55*** via the control device ***11***. " Page 5, ¶ 3. ll. 13-15. Data bits: "It should be noted that the junction points ***22a – 22n*** are used for voice communication signals, and the junction points ***23a – 23n*** are used for data or control signals." Page 5, ¶ 1, ll.15-17.
(b) a central site system operatively coupled to said cell site systems, comprising:	Yes	Switching station ***1*** and position location calculating device ***2***.
means for processing said frames of data from said cell site systems	Yes	"The base station ***1*** forwards these data to the position location calculating device ***2***, and the position of the mobile equipment ***5*** is calculated." Page 4, ¶ 2, ll.23-25.
to generate a table identifying individual cellular telephone signals and the differences in times of arrival of said cellular telephone signals among said cell site systems;	Yes	"reports to the switching station ***1*** via the control devices ***11a – 11n*** data such as the difference in arrival time of position locating signals with respect to the various base stations ***3a – 3n***." Page 4, ¶ 2, ll. 21-23.
and means for determining, on the basis of said times of arrival differences, the locations of the cellular telephones responsible for said cellular telephone signals.	Yes	"The base station ***1*** forwards these data to the position location calculating device ***2***, and the position of the mobile equipment ***5*** is calculated." Page 4, ¶ 2, ll. 23-25.

Claim Language	Present In Kono?	Kono Disclosure
2. A cellular telephone location system as recited in claim 1,	Yes	See the above claim chart for claim 1.
wherein said timing signal receiver comprises a global positioning system (GPS) receiver.	Yes	Since at least as early as 1993, some cellular networks have had GPS receivers at every base station. The location systems disclosed in the Kono reference and the '144 patent work in conjunction with cellular networks. When those cellular networks have GPS receivers, they can be used by the location system.

Claim Language	Present In Kono?	Kono Disclosure
22. A ground-based cellular telephone system serving a plurality of subscribers possessing mobile cellular telephones, comprising:	Yes	"FIG. 1 shows a configuration of a moving body position locating apparatus" Page 3 ¶ 6, ll. 12.
(a) at least three cell sites;	Yes	Base stations 3a-3n.
equipped to receive signals sent by multiple mobile cellular telephones	Yes	Control channel transceivers ***12a-12n***.
each initiating periodic signal transmissions	Yes	"a moving body transmits position locating signals using shared channels" Page 3 ¶ 5, l. 1.
over one of a prescribed set of reverse control channels	Yes	"***12a – 12n*** are control channel transceivers that transmit and receive signals for the control channels allotted for each of the base stations ***3a – 3n.***" Page 2, ¶ 2, ll. 5-6.
(b) locating means for automatically determining the locations of said cellular telephones by receiving and processing signals emitted during said periodic reverse control channel transmissions; and	Yes	Kono teaches software and processors in control unit ***55*** that determine and format time of arrival information. "The standard clock ***54*** is an ultra-high precision clock, and the time measurement circuit ***53*** measures the absolute time of the above-mentioned trigger, and reports it to the switching station ***1*** from the control circuit ***55*** via the control device ***11***." Page 5, ¶ 3. ll. 13-15. "The base station ***1*** forwards these data to the position location calculating device ***2***, and the position of the mobile equipment ***5*** is calculated." Page 4, ¶ 2, ll. 23-25.

(c) database means for storing location data identifying the cellular telephones and their respective locations, and for providing access to said database to subscribers at remote locations.	Yes	Since their inception in the early 1990s, GSM networks have had Home Location Registers ("HLRs") and Visitor Location Registers ("VLRs"). Because Andrew's products do not have a database, if TruePosition argues for an interpretation of "database means" that is broad enough to encompass Andrew's products, this element is anticipated by the HLR and VLR inherent in the cellular systems taught by the Kono application.

Claim Language	Present In Kono?	Kono Disclosure
31. A method for determining the location(s) of one or more cellular telephones	Yes	"FIG. 1 shows a configuration of a moving body position locating apparatus" Page 3 ¶ 6, ll. 12.
each initiating periodic signal transmissions over one of a prescribed set of reverse control channels, comprising the steps of:	Yes	"a moving body transmits position locating signals using shared channels" Page 3 ¶ 5, l. 1.
(a) receiving said reverse control channel signals at least three geographically separated cell sites;	Yes	"***12a – 12n*** are control channel transceivers that transmit and receive signals for the control channels allotted for each of the base stations ***3a – 3n.***" Page 2, ¶ 2, ll. 5-6.
(b) processing said signals at each cell site to produce frames of data, each frame comprising a prescribed number of data bits and time stamp bits, said time stamp bits representing the time at which said frames were produced at each cell site;	Yes	Kono teaches software and processors in hardware unit 55 that determine and format time of arrival information. Time stamp bits: "The standard clock ***54*** is an ultra-high precision clock, and the time measurement circuit ***53*** measures the absolute time of the above-mentioned trigger, and reports it to the switching station ***1*** from the control circuit ***55*** via the control device ***11***." Page 5, ¶ 3. ll. 13-15. Data bits: "It should be noted that the junction points ***22a – 22n*** are used for voice communication signals, and the junction points ***23a – 23n*** are used for data or control signals." Page 5, ¶ 1, ll.15-17.

(c) processing said frames of data to identify individual cellular telephone signals and the differences in times of arrival of said cellular telephone signals among said cell sites; and	Yes	"reports to the switching station *1* via the control devices *11a – 11n* data such as the difference in arrival time of position locating signals with respect to the various base stations *3a – 3n*." Page 4, ¶ 2, ll. 21-23.
determining, on the basis of said times of arrival differences, the locations of the cellular telephones responsible for said cellular telephone signals.	Yes	"The base station *1* forwards these data to the position location calculating device 2, and the position of the mobile equipment *5* is calculated." Page 4, ¶ 2, ll. 23-25.

Claim Language	Present In Kono?	Kono Disclosure
32. A method as recited in claim 31,	Yes	See the above claim chart for claim 31.
further comprising the steps of storing, in a database, location data identifying the cellular telephones and their respective locations, and providing access to said database to subscribers at remote locations.	Yes	Since their inception in the early 1990s, GSM networks have had Home Location Registers ("HLRs") and Visitor Location Registers ("VLRs"). Because Andrew's products do not have a database, if TruePosition argues for an interpretation of "database means" that is broad enough to encompass Andrew's products, this element is anticipated by the HLR and VLR inherent in the cellular systems taught by the Kono application.

IV. RESERVATION OF RIGHTS

This report presents my opinions to date regarding the matters set forth above. As additional data, information, or testimony becomes available to me or is provided to me, I intend to consider this information. I thus reserve the right to modify or supplement this report or the opinions contained herein if I find it appropriate to do so in light of any additional information. I may also be called upon to, and intend to if asked, provide expert testimony in rebuttal to any proofs put forth by TruePosition or any opinions expressed in expert reports on behalf of TruePosition.

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Dated: December 1, 2006

David J Goodman

Dr. David J. Goodman

EXHIBIT A

CURRICULUM VITAE OF DR. DAVID GOODMAN

I. BIOGRAPHY

Since 1999, David Goodman has been a Professor of Electrical and Computer Engineering at Polytechnic University in Brooklyn, New York. He currently holds a temporary position as Program Director in the Computer and Network Systems Division of the National Science Foundation. Before joining the NSF in February 2006, he was Director of the Wireless Internet Center for Advanced Technology, a National Science Foundation Industry/University Cooperative Research Center at Polytechnic University, Columbia University, and University of Virginia. Until August 2001, he was Head of the Electrical and Computer Engineering Department at Poly.

Prior to joining Poly, Dr. Goodman was a professor at Rutgers University, where he founded the Wireless Information Network Laboratory (WINLAB) in 1989. He was WINLAB Director until he moved to Brooklyn Poly. In 1995, he was a Research Associate at the Program on Information Resources Policy at Harvard University. In 1997, he was Chairman of the National Research Council Committee studying "The Evolution of Untethered Communications." From 1967 to 1988 he was at Bell Laboratories, where he was Department Head in Communications Systems Research. He has made fundamental contributions to digital signal processing, speech coding, and wireless information networks.

Dr. Goodman is a member of the National Academy of Engineering and a foreign member of The Royal Academy of Engineering, a Fellow of the Institute of Electrical and Electronic Engineers, and a Fellow of the Institution of Electrical Engineers. In 1997, he received the ACM/SIGMOBILE Award for "Outstanding Contributions to Research on Mobility of Systems Users, Data, and Computing". In 1999 he won the RCR Gold Award for the best presentation at the Conference on Third Generation Wireless Communications. In 2003, he received the Avant Garde award from the Vehicular Technology Society of the IEEE. Three of his papers on wireless communications have been cited as Paper of the Year by IEEE journals.

Dr. Goodman is a frequent public speaker in a variety of forums on wireless communications. He is author of the books "Wireless Personal Communications Systems", published in 1997 by Addison Wesley and co-author, with Roy Yates, of "Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers", published by Wiley in 1998, with a second edition published in 2004. He is a co-editor of six other books on wireless communications. He received a Bachelor's degree at Rensselaer Polytechnic Institute (1960), a Master's at New York University (1962), and a Ph. D. at Imperial College, University of London (1967), all in Electrical Engineering.

II. EDUCATION

Doctor of Philosophy (Electrical Engineering), 1967
Imperial College, University of London

Master of Electrical Engineering, 1962
New York University

Bachelor of Electrical Engineering, 1960
Rensselaer Polytechnic Institute

III. PROFESSIONAL EXPERIENCE

National Science Foundation, 2006 - Present
Program Director
Computer and Network Systems Division
(On leave from Polytechnic University)

Polytechnic University, 1999 - Present
Professor of Electrical and Computer Engineering
Director, NSF Wireless Internet Center for Advanced Technology
Head Of Department, 1999-2001

Rutgers University, 1988 - 1999
Director, Wireless Information Network Laboratory (WINLAB), 1989 - 1999
Chair, Department of Electrical and Computer Engineering, 1988 - 1991

Harvard University, 1995
Research Associate, Program on Information Resources Policy

AT&T Bell Laboratories 1960 - 1962, 1967-1988
Department Head, Communications Systems Research

Imperial College, London, 1983-1988
Visiting Professor of Electrical Engineering

Southampton University, 1987-1990
Visiting Professor of Electronics and Computer Science

IV. HONORS AND AWARDS

Member, National Academy of Engineering

Foreign Member, Royal Academy of Engineering

Fellow, Institute of Electrical and Electronic Engineers

Fellow, Institution of Electrical Engineers

2003 IEEE Avant Garde Award for Contributions to Speech Coding and Internet-Packet Cellular Networks

1999 RCR Gold Award for Best Talk at Wireless Technology Conference

1997 ACM Award for Outstanding Contributions to Research on Mobility of Systems, Users, Data and Computing

Paper of the Year: IEEE Transactions on Vehicular Technology: 1992

Paper of the Year: IEEE Communications Magazine: 1992

Paper of the Year: IEEE Transactions on Vehicular Technology: 1988

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   John Wiley & Sons, Inc., 454 pgs. (1998).

3. **Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers, 2nd. edition**
   R. D. Yates and D. J. Goodman
   John Wiley & Sons, Inc., 519 pgs. (2004).

4. **Third Generation Wireless Information Networks**
   S. Nanda and D. J. Goodman, Ed.
   Kluwer Academic Publishers, 317 pgs. (1992).

5. **Wireless Communications - Future Directions**
   J. Holtzman and D. J. Goodman, Ed.
   Kluwer Academic Publishers, 339 pgs. (1993).

6. **Wireless and Mobile Communications**
   J. Holtzman and D. J. Goodman, Ed.
   Kluwer Academic Publishers, 286 pgs. (1994).

7. **Mobile Multimedia Communications**
   D. J. Goodman and D. Raychaudhuri, Ed.
   Plenum Press, 321 pgs. (1997).

8. **The Evolution of Untethered Communications, Committee on Evolution of Untethered Communications**
   D. J. Goodman
   Chair, National Academy Press, 189 pgs. (1997).

9. **System-Level Power Optimization for Wireless Multimedia Communication Power Aware Computing**
   R. Karri and D.J. Goodman, Ed.
   Kluwer Academic Publishers, 248 pgs., (2002).

EXHIBIT B

MATERIALS CONSIDERED BY DR. DAVID GOODMAN

1. U.S. Patent 5,327,144
2. Prosecution History of U.S. Patent 5,327,144
3. Japanese Laid-open Patent Application (JP3239091)
4. English Translation of Japanese Laid-open Patent Application (JP3239091)
5. Andrew's Response to TruePosition's 1st Set of Interrogatories (dated April 7, 2006)
6. Andrew Corporation's Supplemental Responses to TruePosition's First Set of Interrogatories (dated June 23, 2006)
7. Andrew Corporation's Supplemental Responses to TruePosition's Interrogatory Nos. 3 and 7 (dated November 8, 2006)
8. TruePosition's Responses to Defendant's First Interrogatories (dated May 1, 2006)
9. TruePosition's Supplemental Responses to Defendant's First Interrogatories (dated May 22, 2006)
10. TruePosition's Second Supplemental Responses to Defendant's First Interrogatories (dated August 1, 2006)
11. TruePosition's Third Supplemental Responses to Defendant's First Interrogatories (dated August 9, 2006)
12. TruePosition's Seventh Supplemental Responses to Defendant's First Interrogatories (November 6, 2006)
13. Andrew's Preliminary Claim Constructions as of November 22, 2006 (dated November 22, 2006)
14. TruePosition's Identification of Claim Terms and Proposed Constructions (dated November 22, 2006)
15. TruePosition's Proposed Construction of Claim Terms and Phrases That Andrew Believes Required Construction (November 27, 2006)
16. Rob Anderson 30(b)(6) Deposition Transcript (November 14, 2006)
17. Rob Anderson Deposition Transcript (September 21, 2006)
18. Rob Anderson 30(b)(6) Deposition Transcript (October 24, 2006)
19. Curtis Knight Deposition Transcript (October 6, 2006)
20. Joseph Sheehan Deposition Transcript (October 19, 2006)

21. John Webber Deposition Transcript (October 4, 2006)

22. Wikipedia

23. Wireless Personal Communications Systems
    D. J. Goodman
    Addison-Wesley Publishing, 417 pgs. (1997)

CERTIFICATE OF SERVICE

I, Rachel Pernic Waldron, hereby certify that on this 1st day of December, 2006, I served a true and correct copy of the foregoing **EXPERT REPORT OF DR. DAVID GOODMAN ON THE INVALIDITY OF U.S. PATENT NO. 5,327,144** and its accompanying exhibits upon the following individuals in the manner indicated:

VIA ELECTRONIC MAIL

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Rachel Pernic Waldron

Rachel Pernic Waldron

EXHIBIT C

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TRUEPOSITION, INC.,

Plaintiff/Counterclaim-Defendant

vs. CA No. 05-00747-SLR

ANDREW CORPORATION,

Defendant/Counterclaim-Plaintiff

VIDEOTAPED DEPOSITION OF DR. DAVID GOODMAN

New York, New York

Monday, January 15, 2007

Reported by:
Adrienne M. Mignano
JOB NO. 190791

Goodman

Q. Your opinion?

A. Yes, with the opinion expressed in the text.

Q. Now I'm going to give you the opportunity to talk about the typographical errors that you mentioned at the very beginning of your deposition.

A. Okay.

Q. Do you want to go ahead and do that?

A. Well, it's one error in two places.

Q. All right.

A. So if we go to the page 15, the bottom row, it says control channel transceivers 12A to 12N, and that should really be shared channel transceivers, 16A-16N.

And then it's the same situation, if you go to page 17, and there is a part of the table that covers -- pertains to claim 22, and the third row of that requires the same adjustment.

Q. So on page 17 of your invalidity report, the phrase controlled channel

Goodman

transceivers 12A to 12N should read shared channel receivers 16A through 16N?

A. Correct.

Q. Is it your understanding if we look at page 17, just two rows down where it says control channel transceivers, do you see that?

A. Yes.

Q. Is that still accurate in your view?

A. Yes.

Q. If we look at the claim phrase "equipped to receive signals sent by multiple mobile cellular telephones," in that same page 17 of your report, do you see that in block 3 of claim 22?

A. Yes.

Q. Doesn't that equipment refer to the same equipment that's received in the reverse control channels in the claim?

MS. WALDRON: Object to the form. Vague.

Q. Let me tell you what I'm trying to get at. I want to make sure --

Goodman

appreciate your help. I really do.

Q. If you look on page 18 of this report under claim 31, you see again claim phrase receiving said reverse claim signals, and then again you refer to the control channel transceivers 12A through 12N.

I still want to make sure that's still your opinion?

A. Let's me think about it, please.

Q. Certainly.

A. To accurately reflect my -- to accurately convey my opinion, we have to make the same adjustment here as well.

Q. Just so --

A. Should I say exactly --

Q. I think the clearest way to make this record is to allow you to mark up your version of the report, which is an exhibit. And make the changes there, wherever you think it is appropriate.

A. I have been doing that without asking you beforehand.

Q. So go ahead and mark the change that you think would make your report

Goodman

accurate on Exhibit 301.

A. Thank you very much for the opportunity.

MS. WALDRON: Just so the record is clear, we're talking about Exhibit 300, right?

MR. MILCETIC: Excuse me, Exhibit 300, the invalidity report.

BY MR. MILCETIC:

Q. Are there any other changes that you know of at the moment that you would like to make to Exhibit 300 to correct your report?

A. I don't know of any others in Exhibit 300.

Q. The court reporter is about to hand you what's been marked already as Exhibit 466. It's a document titled Draft Translation of Japanese Patent Application. It's AND0080497 to AND00503.

(Plaintiff's Exhibit 466, Draft Translation of Japanese Patent Application, Bates Stamped AND0080497 to AND00503, marked for identification,

Goodman

as of this date.)

A. I have that.

Q. Do you recognize Exhibit 466?

A. Yes.

Q. What is it?

A. It's an English translation of Japanese laid open patent application. It's a draft translation.

Q. Did you rely on this Exhibit 466 in rendering your invalidity report?

A. Yes.

Q. Do you speak Japanese yourself?

A. No, I don't.

Q. Without the translation, would you be able to understand the Japanese reference?

A. No.

Q. Now, what I would like to do, and I'm going to tell you what I'm going to do. You have got Exhibit 466 in front of you, correct, the Japanese translation?

A. Yes.

Q. And you have got in front of you your invalidity report, which is Exhibit 300, which you have now made some corrections to,

correct?

A. Yes.

Q. Feel free to refer to that. And there is also, I believe you also have the patent in front of you?

A. I do.

Q. Which is --

A. 462.

Q. What I'm going to ask you now is a series of questions, and I'm going to go down the summary chart reflecting your opinions for various elements in that chart, I'm going to ask you where you found those elements in the draft translation and why you believe those elements are disclosed in the draft translation of Kono. Is that all right with you?

So we'll go through your report in a little more detail essentially.

A. Of course.

Q. Now, let's start with page 15 of your invalidity report. The first row.

A. I have that.

Q. The phrase is "a cellular location

that before lunch.

Q. But you testified that Andrew doesn't use that signal format, right, the signal format in the cellular telephone standards that define reverse control channel in a way that you are interpreting it, right?

A. Yes.

Q. And you also testified that Kono discloses that element to the same extent as Andrew practices that element, correct?

A. Yes.

MS. WALDRON: Objection.

Q. Doesn't it follow then that Kono doesn't then disclose that element?

A. I think to give a complete opinion, I'd have to say that somebody who would find that element in Andrew would have to find it in Kono. So if somebody doesn't find it in Andrew, I don't know, but -- I think that's -- that sentence is my opinion.

Q. And what is the basis for that opinion?

A. The basis for that opinion is that the shared channel in the Kono application

Goodman

has similar properties to the stand-alone dedicated control channel that I understand is TruePosition's. It conforms to the prescribed set of reverse control channels, because, as you know, I have done the infringement analysis as well as the invalidity analysis, so I'm aware of how TruePosition interprets this and I think they are compelled to say. I know you have had different experts for the two things. I think if you ask Dr. Gottesman, he would have to say, oh, yeah, it's in Kono too because of the way he found it in Andrew. I don't agree with him.

Q. When did you first learn how TruePosition contends that Geometrix infringes the patent?

A. I suppose it was in the summer when Mr. Parks told me about the lawsuit.

Q. When did you start learning about how Geometrix works in terms of its operation?

A. I think it was in October, towards the middle or end of October.

Goodman

A. May I look at my claims construction that are in these exhibits?

Q. Certainly. I believe your claim construction is Exhibit --

A. So somewhere I defined means for processing. So it might help me to --

Q. Yes. I think it is 463 or 464 that you did that.

A. Yes, I see something on 463. I'd like also to look at one of the other exhibits, which was Andrew's proposed claim construction from November 22nd.

Q. That's Exhibit 301.

A. 301. Thank you. I'm going to refer to Exhibit 301.

Just to be absolutely certain, would you read the question, please, just so I know what I'm answering.

(Record read)

Q. I can clarify if you like.

A. I want to make sure I'm answering the right question. It wasn't that it was unclear.

Q. Under your construction today, you

Goodman

just looked it up --

A. It's actually 465, I think.

Q. In Exhibit 465. Does Kono disclose the means for processing limitation?

A. It's --

MS. WALDRON: Objection. Vague. Calls for legal conclusion.

A. It's my opinion that someone of skill in the art who finds that claim element in Geometrix equipment would be compelled to say that it also exists in Kono.

Q. What's the basis for your opinion?

A. The basis for my opinion is this statement in Exhibit 466 that something reports to the switching station data such as the difference in arrival time of position locating signals with respect to the different base stations.

Q. The construction that you laid out this morning for means for processing encompassed Figure 6A and Figure 7, correct?

A. Yes.

Q. If I went through those figures on a block by block basis, would you be able to

Goodman

A. My opinion is that if somebody finds that disclosed -- if somebody finds the Geometrix is receiving signals from multiple mobile cellular telephones, they would have to admit that Kono technology is also receiving signals sent by multiple mobile cellular telephones.

Q. How would one have to interpret the claims to say that Geometrix has equipment for receiving signals sent by multiple mobile cellular telephones?

MS. WALDRON: Objection. Legal conclusion. Speculation.

A. It's a very difficult question to answer because I think it is impossible. I can try to stretch my mind to think of some weird interpretation.

Q. So it's impossible to or very difficult to say that this claim limitation equipped to receive signals encompasses Geometrix, correct?

A. I really haven't done that analysis. I suppose I could.

Q. Well, let me ask you this. Let's

Goodman

get back to basics here for a moment.

Your position here is that if Geometrix is encompassed by the claims, then Kono invalidates the '144 patent, right?

A. Yes, that's right. If someone puts Geometrix in the '144 circle, they are really stuck with Kono.

Q. Can you give me any interpretation under which of the claims, under which Geometrix infringes the '144 patent?

MS. WALDRON: Objection. Legal conclusion. Speculation.

A. I can't do this sitting here. I don't know how much time Dr. Gottesman tried -- spent trying to do that and he completely failed, so I think that even if I went off for a month, if TruePosition hired me, I would be hard pressed to do any better than Dr. Gottesman did.

Q. So you don't know of any construction sitting here right now under which Geometrix infringes the '144 patent; am I correct?

MS. WALDRON: Same objection.

Goodman

Compound. Overbroad. Legal conclusion.

Q. Is there an easier claim that you can deal with more simply?

A. I'm not trying to save work. So if you prefer claim 1, I'll work on that one. I think it is more detailed than some of the others.

Q. Why don't we do claim 22.

A. Okay, that might take less time.

MS. WALDRON: Same objections for the record. Compound. Overbroad. Legal conclusion.

A. Essentially you're asking me to do Dr. Gottesman's job, so can I refer to his report, because I assume that's what he was asked to do by TruePosition?

Q. You rendered an invalidity report, and each time that I asked you for the basis for why it is that you think it is invalid, you keep telling me, well, if the claims encompass Geometrix, then the patent is invalid.

A. Right.

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Goodman

you think that's inaccurate.

A. If you don't mind, I'll draw a line through it and I'll state for the record that it doesn't represent the response to your request.

Q. Okay, fair enough.

A. So I'm crossing out 469 and 470. And I'm submitting 471 and 472.

Q. How would you characterize what you have written on 471 and 472, Exhibits?

MS. WALDRON: Objection. Calls for a narrative.

A. Oh, what I have written on my exhibit is what the claim construction that TruePosition would need to get to prove infringement of the Geometrix band.

Q. Is it also the claim construction that you used to render your invalidity opinion?

A. Yes.

Q. Just so the record is clear, you do not agree with the construction written on Exhibit 471 and 472, correct?

A. That's correct.

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EXHIBIT D

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TruePosition, Inc. **Plaintiff/** **Counterclaim-Defendant,** **v.** **Andrew Corporation,** **Defendant/** **Counterclaim-Plaintiff.**	))))))))))))	**C.A. No. 05-747 (SLR)**

EXPERT REPORT OF BRIAN G. AGEE, PH.D., P.E. RESPONSE TO DR. DAVID GOODMAN'S REPORT ON THE VALIDITY OF U.S. PATENT NO. 5,327,144

B 66

EXHIBIT E

UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

\- - -

TRUEPOSITION, INC., Plaintiff/Counterclaim Defendant,	
vs.	C.A. No. 05-00747-SLR
ANDREW CORPORATION, Defendant/ Counterclaim Plaintiff.	

VIDEOTAPED DEPOSITION OF BRIAN G. AGEE, Ph.D., P.E.

Philadelphia, Pennsylvania

Wednesday, January 24, 2007

8:20 a.m.

Job No.: 25500251

Pages: 1 - 191

Reported By: Debra A. Whitehead

B 67

071d12b8-ba02-4b38-8165-5a02f8f3badc

071d12b8-ba02-4b38-8165-5a02f8f3badc

071d12b8-ba02-4b38-8165-5a02f8f3badc

071d12b8-ba02-4b38-8165-5a02f8f3badc

EXHIBIT F

Oded Gottesman Report:

Oded Gottesman Report:

Oded Gottesman Report

EXHIBIT G

UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

\- - -

TRUEPOSITION, INC., Plaintiff/Counterclaim Defendant,	
vs.	C.A. No. 05-00747-SLR
ANDREW CORPORATION, Defendant/ Counterclaim Plaintiff.	

VIDEOTAPED DEPOSITION OF ODED GOTTESMAN, Ph.D.

VOLUME I

Philadelphia, Pennsylvania

Thursday, January 11, 2007

8:52 a.m.

Job No.: 25500247

Pages: 1 - 284

Reported By: Debra A. Whitehead

B 94

6f3bb311-a516-49bb-9616-a0f382ebac82

UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

\- - -

TRUEPOSITION, INC.,)
Plaintiff/Counterclaim)
Defendant,)
)
vs.) C.A. No. 05-00747-SLR
)
ANDREW CORPORATION,)
Defendant/)
Counterclaim Plaintiff.)
____________________________)

VIDEOTAPED DEPOSITION OF ODED GOTTESMAN, Ph.D.

VOLUME II

Philadelphia, Pennsylvania

Friday, January 12, 2007

9:12 a.m.

Job No.: 25500261

Pages: 285 - 451

Reported By: Debra A. Whitehead

EXHIBIT H

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TRUEPOSITION, INC.,

Plaintiff/Counterclaim-Defendant

vs. CA No. 05-00747-SLR

ANDREW CORPORATION,

Defendant/Counterclaim-Plaintiff

CONTINUED VIDEOTAPED DEPOSITION

OF DR. DAVID GOODMAN

New York, New York

Tuesday, January 16, 2007

Reported by:
Adrienne M. Mignano
JOB NO. 190793

B 102

Goodman

a few of them, and even in those references, he wasn't very specific. He just said it's in there somewhere. Essentially he said, well, this claim limitation is met by a certain function and he gave production numbers for where that function appears in the source code, but that was about all he said without going into the -- without really identifying where in the source code the claim limitation is met or how the source code meets the limitation, just that it is there somewhere. And I didn't find it there. I looked at it.

Q. You also mentioned conversations with Andrew employees.

Did you talk to Andrew employees on one occasion, multiple occasions, how many times?

MR. MILCETIC: Objection.

A. I --

Q. Let me rephrase that.

Approximately how many times did you talk to Andrew employees?

A. I would say five or six.

B 103

Goodman

Q. What was the purpose of those discussions?

A. Well, generally speaking, the purpose was to find out from them how their -- what's happening in their Geometrix system, and then as I absorbed and interpreted what they told me and I looked at other material, particularly that written document that says something about -- has Grayson in the title. I wanted to make sure that that is really what's in the equipment that they sent to Saudi Arabia. So I don't know if Mr. Carlson got annoyed with me, but I must have asked him three or four times is that what you're doing, and as I interpreted, I didn't read him this report, maybe he had access to the report, but I just asked him over and over again, is this what you -- is that what you have done -- part of it was to educate me, and then the later conversations were just to make absolutely sure that they confirmed that that's what is in their equipment because I expected to -- well, first of all, submit this report and then

B 104

Goodman

testify about it.

Q. About how much time total would you say you spent talking to Andrew employees?

A. Maybe five or six hours. I suppose. I was there for three hours. I guess I had a few hour long conversations, so my first guess is six hours. Maybe seven.

Q. Did you also review --

MS. WALDRON: Strike that.

Q. What else, if anything, did you review --

MS. WALDRON: Strike that.

Q. What else did you do to form the basis of your opinions in addition to talking with Andrew employees?

MR. MILCETIC: Objection. Go ahead.

A. I read the patent carefully and several times I suppose, and I read Dr. Gottesman's report endless times. Certainly that -- something we haven't mentioned is that I have my position, printed copies of these Geometrix release notes that are listed here. And I looked at them, they

B 105

Goodman

gave me kind of a general idea of what's happening, but I didn't find sufficient detail to be able to come to the opinion that I'm expressing now. So it was somewhat helpful. I read some of the documents that the two parties to the lawsuit exchanged. That was sent to me.

Q. So you did --

A. Obviously I studied, you know, I -- I have a strong background in cellular communications. I used to have a strong -- I used to do a lot of research in digital signal processing. In fact, I'm a fellow of the IEEE, and that was for my research in signal processing before I got into communications. But I kind of needed a refresher course, and I read some of the references that are listed here, particularly on ambiguity functions and time of arrival estimation.

Q. So you did review documents in connection with your report?

A. Oh, of course, yes.

Q. Did you also review some source

B 106

Goodman

code?

A. I looked at the source code, yes, and tried to find in there the evidence that Dr. Gottesman said he found. But he wasn't specific and I couldn't find it either.

Q. Did anything you reviewed cause you to doubt the accuracy of information given to you by Andrew employees?

A. I never doubted the accuracy, but it took me a while to really be confident that I understood what they told me. So I interpreted it and then went back and asked them again and again. And sometimes I really needed, I don't know what, construction reinforcement. I wasn't quite sure I remembered what they told me or interpreted it. So I don't know if they think I'm thick asking the same questions over and over again. When I got the same answer two or three times, I was willing to put my name on it and testify in this deposition about it.

Q. Dr. Goodman, could you please turn to page 25 of Dr. Gottesman's report, which I believe has been marked as Exhibit 477.

EXHIBIT I

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

TRUEPOSITION, INC.)	Civil Action
Plaintiff,)	No. 05-747
vs.)	
ANDREW CORPORATION,)	
Defendant.)	

VIDEOTAPED DEPOSITION OF

ANDREW BECK

Reston, Virginia

Friday, September 22, 2006

9:05 a.m.

Job No.: 22-87165

Pages 1 through 318

Reported by: John L. Harmonson, RPR, CCR

14:40:53 on a stand-alone dedicated control channel, how
14:40:58 will the WLSs know how to listen to that
14:41:03 information transmitted on that channel?

14:41:06 A. The GCS is tasked with a location
14:41:12 request, and in that location request it's given
14:41:16 the RF information that are needed by the WLSs.

14:41:18 Q. Where does the RF information come
14:41:19 from?

14:41:22 A. A source external to the Geometrix PDE.

14:41:25 Q. That's an MT-LR, correct?

14:41:26 A. As one example.

14:41:28 Q. When you're using an Abis monitoring
14:41:31 unit, however, doesn't the RF information come
14:41:33 from the Abis monitoring unit?

14:41:36 A. The Abis monitoring unit could be used
14:41:40 as a source of RF information, yes.

14:41:42 Q. Would you consider an implementation of
14:41:46 the Geometrix PDE that includes an AMU to be
14:41:50 standards compliant?

14:41:55 A. We need to clarify what standards we're
14:41:56 compliant with.

14:41:59 Q. Well, let's talk about GSM standards
14:42:02 that you were referring to earlier.

A. Uh-huh.

732268a4-6d34-4003-8423-8b4f402c5102

14:36:37 ANDREW BECK, 9/22/06 178

14:36:42 slave -- a slave system that works on transaction
14:36:47 basis. In order to locate, we have to be told
14:36:52 that there is a location event that we need to
14:36:58 perform location on. So the system, external to
14:37:02 the Andrew PDE, would alert us that a condition
14:37:06 exists that it would like us to perform a location
14:37:11 has to be installed, configured and set up to do
14:37:12 such messaging.
14:37:16 Q. Anything else?
14:37:19 A. In addition, the Andrew PDE has to be
14:37:22 capable of performing that as well and properly
14:37:24 licensed to do so.
14:37:27 Q. You referred to the Andrew PDE in this
14:37:30 context as a slave system, correct?
14:37:30 A. Correct.
14:37:35 Q. Earlier, we were talking about an Abis
14:37:37 monitoring unit. Do you remember when we talked
14:37:38 about that?
14:37:40 A. Yes.
14:37:44 Q. When Andrew is using an Abis monitoring
14:37:47 unit, let's say for testing, would you still
14:37:51 characterize the system as a slave system?
14:37:54 A. Yes, I would.
Q. What is the function of the Abis

732268a4-6d34-4003-8423-8b4f402c5102

14:37:56
14:38:00 monitoring unit, as best you know?
14:38:05 A. The Abis monitoring unit has a
14:38:11 connection into Abis interfaces in the GSM network
14:38:17 and basically extracts and reads messages across
14:38:19 Abis links.
14:38:24 Q. Under the right conditions and
14:38:30 installations, the planets aligned, assuming all
14:38:38 that, can the -- can any product do location of a
14:38:42 mobile transmitting on a stand-alone dedicated
14:38:53 control channel when it is not doing MT-LR?
14:38:54 MS. WALDRON: Objection; vague and
14:38:55 compound.
14:38:57 THE WITNESS: Can you clarify "in any
14:38:57 product"?
14:38:58 BY MR. MILCETIC:
14:39:01 Q. Well, the Andrew PDE.
14:39:04 A. So the question is: Can the Andrew PDE
14:39:07 perform a location on a stand-alone dedicated
14:39:12 control channel exclusive of the MT-LR mode?
14:39:14 Q. Right.
14:39:17 A. Yes, it can.
14:39:24 Q. Could you describe that circumstance?
14:39:27 A. If the Andrew PDE were externally
tasked by an AMU, it could be told to perform a

EXHIBIT J

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TRUEPOSITION, INC.,

Plaintiff and
Counterclaim-Defendant,

v.

ANDREW CORPORATION,

Defendant and
Counterclaim Plaintiff.

Civil Action No. 05-00747-SLR

DECLARATION OF DR. DAVID J. GOODMAN IN SUPPORT OF ANDREW'S OPPOSITION TO TRUEPOSITION'S MOTION FOR SUMMARY JUDGMENT THAT ANDREW CANNOT PROVE ITS CLAIMS OF INVALIDITY

1. I, Dr. David J. Goodman, make this declaration upon personal knowledge, and if called to testify, could and would testify hereto.

2. I am currently a professor of Electrical and Computer Engineering at Polytechnic University in Brooklyn, New York. From February 2006 to February 2007, I was a Program Director at the National Science Foundation in Arlington, Virginia on temporary assignment from Polytechnic University. Before joining the NSF, I was Director of the Wireless Internet Center for Advanced Technology (WICAT), located at Polytechnic University, Columbia University, and the University of Virginia. WICAT is a National Science Foundation Industry/University Cooperative Research Center. From August 1999 until August 2001, I was Head of the Department of Electrical and Computer Engineering at Polytechnic University.

3. Before joining Polytechnic University in 1999, I was a Professor of Electrical and Computer Engineering at Rutgers, the State University of New Jersey. From 1988 until 1991, I was Chairman of the Department of Electrical and Computer Engineering at Rutgers. In 1989, I founded the Wireless Information Network Laboratory (WINLAB) at Rutgers University. WINLAB was the first center of excellence at a United States university focused on cellular telecommunications. In 1991, WINLAB was designated the National Science Foundation Industry/University Cooperative Research Center for Wireless Information Networks. I was the Director of WINLAB until 1999, when I joined Polytechnic University.

4. From 1967 to 1988, I was at Bell Laboratories, where I held the position of Department Head in Communications Systems Research. In 1995, I was a Research Associate at the Program on Information Resources Policy at Harvard University. In

1997, I was Chairman of the National Research Council Committee studying "The Evolution of Untethered Communications."

5. I have extensive experience performing and managing research in telecommunications and digital signal processing. My research in cellular telecommunications has produced innovations covering multiple access protocols, network architecture, mobility management, and radio resources management. In 1986 and 1987, while I was employed by AT&T Bell Laboratories, I had a research assignment in the United Kingdom. As part of this assignment, I had detailed technical discussions with experts in several European countries who were participating in the establishment of the GSM cellular standard. At that time, I acquired a thorough understanding of GSM technology, and I have maintained this expertise ever since through technical discussions, participation in various forums, and in the conduct of my teaching, research, and writing.

6. I was one of the first professors to teach a college-level course in cellular telecommunications and have taught such courses since January 1989. In the early 1990's, I also presented a three-day short course at many large companies including Bell Atlantic Mobile, Pacific Bell, US West, Ericsson and AT&T. This course introduced corporate students to the operations of several cellular systems including AMPS, TDMA, and GSM. I have lectured and published widely on the subject of cellular telecommunications. My publications include approximately 100 papers. I have also consulted for many corporations in this field, including: Ericsson, Motorola, Lucent Technologies, and Nortel Networks.

7. I received a Bachelor's degree at Rensselaer Polytechnic Institute in 1960, a Master's degree at New York University in 1962, and a Ph.D. at Imperial College, University of London in 1967, all in electrical engineering.

8. I am a Member of the National Academy of Engineering, a Foreign Member of The Royal Academy of Engineering, a Fellow of the Institute of Electrical and Electronics Engineers, and a Fellow of the Institution of Electrical Engineers.

9. In 1997, I received the ACM/SIGMOBILE Award for "Outstanding Contributions to Research on Mobility of Systems Users, Data, and Computing." In 1999, I won the RCR Gold Award for the best presentation at the Conference on Third Generation Wireless Communications. In 2003, I received an IEEE Avant Garde Award for Contributions to Speech Coding and Internet-Packet Cellular Networks. Three of my papers on wireless communications have been cited as Paper of the Year by IEEE journals.

10. I am a frequent public speaker in a variety of forums on wireless communications. I am author of the books *Wireless Personal Communications Systems*, published in 1997 by Addison Wesley and co-author, with Roy Yates, of *Probability and Stochastic Processes A Friendly Introduction for Electrical and Computer Engineers, Second Edition*, published in 2004 by Wiley. I am co-editor of six other books on wireless communications. I am a named inventor on eight United States patents and have one patent application pending.

11. I have reviewed both Andrew's translation of the Kono reference (attached to this declaration as Exhibit A) and TruePosition's translation of the Kono reference (attached as Exhibit B).

12. In my opinion, there are no substantive differences between the Andrew and TruePosition translations of the Kono reference.

13. My opinion regarding the invalidity of the '144 patent remains the same regardless of which translation is used.

14. If TruePosition continues to object to the translation procured by Andrew, I am willing to use the translation TruePosition provided.

I declare under penalty of perjury that to the best of my knowledge, the foregoing is true and correct.

David J. Goodman

Dr. David J. Goodman

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EXHIBIT K

UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF DELAWARE

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TRUEPOSITION, INC.,	*	
Plaintiff,	*	
vs.	*	C.A. No. 05-0747-SLR
ANDREW CORPORATION,	*	
Defendant.	*	

- - - - - - - - - - - - - - - - - -*

Videotaped Deposition of ANDREW CORPORATION, through its representative, JOHN CARLSON

Reston, Virginia

Monday, October 16, 2006

9:11 a.m.

Job No. 22-87715

Pages 1 - 59

Reported by: Karen Young

Videographer: Richard Fazio

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JOHN CARLSON

09:47:11 MS. PERNIC WALDRON: Actually, I believe -- well, should we go off the record? I mean, I can't testify as to this.

09:47:17 MR. MILCETIC: I just want to know what version of the CD you gave us. Actually, I'd like it on the record. That's all.

09:47:25 MS. PERNIC WALDRON: I cannot testify as to whether it's 2005.0.1 or point 2. I am under the impression that it is point 2.

09:47:35 THE WITNESS: 2005.2.2.

09:47:38 MS. PERNIC WALDRON: Dot 2 dot 2.

09:47:42 THE WITNESS: That's what you're referring to?

09:47:43 MS. PERNIC WALDRON: Yes.

09:47:44 MR. MILCETIC: So as best you understand, it was 2005.2.2.

09:47:48 MS. PERNIC WALDRON: I cannot testify to this. That is my general understanding.

09:48:03 MR. MILCETIC: Well, the witness should be here today prepared to tell us what version of the source code was printed out and given to us, irrespective whoever actually gave it to us, and I don't care whether you testify or Mr. Carlson testifies or Mr. Kennedy testifies, but especially

JOHN CARLSON

09:48:19 having waited nine or ten months for that tiny infinitesimally small piece of information, I want an answer to that question.

09:48:28 MS. PERNIC WALDRON: Well, like I said, I represented to you last week the information that I had. Mr. Carlson is here to testify to the best of his ability as to what AND1 through 72979 is, and he is prepared to do so.

09:48:47 BY MR. MILCETIC:

09:48:47 Q. Okay, Mr. Carlson, to the best of your knowledge, what version of the source code was produced as AND000001 through AND0072979?

09:49:02 A. My understanding is that that -- those printouts correspond to software version 2005.2.2.

09:49:10 Q. I understood you to testify earlier that you were also here testifying on behalf of Andrew Corporation concerning topic 11 of Exhibit 180.

09:49:42 MS. PERNIC WALDRON: Objection, mischaracterizes. The topic's been amended.

09:49:48 BY MR. MILCETIC:

09:49:48 Q. With respect to the amended topic that Ms. Waldron read into the record; is that correct?

09:49:59 A. I'm sorry. Could you repeat the amended topic please?

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09:50:09 MS. PERNIC WALDRON: My impression of the
09:50:10 topic that has been agreed to is the versions of the
09:50:13 Geometrix source code put on the escrow computer,
09:50:17 whether the included source code versions are complete
09:50:19 or partial, and the location of the source code before
09:50:21 it was copied to the escrow computer.

09:50:24 A. Yes.

09:50:25 Q. What versions of Geometrix source code are
09:50:34 on the laptop computer in escrow at the Iron Mountain
09:50:41 facility?

09:50:42 MS. PERNIC WALDRON: Counsel, objection.
09:50:43 This isn't supposed to be a memory test. You have a
09:50:46 list of the versions you requested?

09:50:49 BY MR. MILCETIC:

09:50:49 Q. Well, the -- you've read some release notes
09:50:55 today, correct?

09:50:56 A. Yes.

09:50:58 Q. Does that refresh your recollection as to
09:51:00 what versions are in the laptop at Iron Mountain?

09:51:09 A. My recollection of the versions that are on
09:51:12 the laptop are that it contained everything that was
09:51:20 on the initial CD that was provided to the Woodcock
09:51:24 Washburn attorneys, so those five revisions, in
09:51:29 addition to -- in addition to various bug fix minor